DIVIDEND INITIATION AND DIFFERENTIAL INFORMATION: AN EMPIRICAL INVESTIGATION

BY

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TABLE OF CONTENTS

Abstract of Dissertation Presented to the Graduate School of the University of Florida in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

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The information transmission hypothesis states that firms begin paying dividends as a means of transmitting information to investors. Evidence that dividend and earnings information is partially substitutable has been used to support this hypothesis. This is not an appropriate test. Instead, a testable implication of the information transmission hypothesis is that dividend initiation should increase the proportion of publicly disclosed to privately acquired information.

The informativeness of quarterly earnings announcements before and after dividend initiation is examined using returns and standardized variance measures. Under the information transmission hypothesis, the standardized variance of earnings and dividend announcements, should increase after dividend

initiation. Further, firms which have the least amount of available information should experience the greatest change.

I find that while returns measures decrease after dividend initiation, standardized variance measures do not. Firms with the low information availability have larger price revaluations. This relationship is not found with standardized variance. There appears to be no evidence that the proportion of publicly disclosed information increases after dividend initiation.

The observed decrease in returns measures of information content may be explained by a reduction in returns volatility that coincides with dividend initiation. Tests are conducted to detect if an information effect associated with dividend initiation is causing the returns volatility to decrease. Such an effect could cause returns volatility to decline by reducing bid-ask spreads or noise trading. Variance ratio tests fail to detect any such decrease following dividend initiation.

Analysis of the timing of variance changes reveals that dividend decreases are equally likely before as after dividend initiation. Therefore, decreases in returns volatility do not systematically occur after dividend initiation. This weakens the contention that information conveyed by the dividend initiation has caused the volatility decrease.

The observed volatility decrease appears to be caused by a large proportion of sample firms initiating dividends in the

period 1974-1977. This period also coincides with a decrease in volatility for the market in general. After adjusting for market volatility, the reduction in firm volatility is much reduced. The general conclusion is that information related effects do not appear to cause the reduction in returns volatility.

CHAPTER 1
INTRODUCTION

Why firms pay dividends is an enduring puzzle in finance. One motivation that has been advanced is that dividends convey information to investors. This information content of dividends or dividend signalling hypothesis was first suggested by Miller and Modigliani (1961) and subsequently formalized by Ross (1977), Bhattacharya (1979), Miller and Rock (1985) and John and Williams (1985) among others. In addition to this signalling hypothesis, some researchers have proposed that initiating dividends may augment the process by which information about firms is transmitted to investors. I refer to this expanded role for dividends as the information transmission hypothesis. For example, Asquith and Mullins (1983) state that

> Dividend policy has several attractive aspects as an information transmission mechanism. Unlike the detailed focus of other announcements, dividends can be used as a simple, comprehensive signal of management's interpretation of the firm's recent performance and its future prospects. Unlike most announcements, dividend announcements must be backed with hard cold cash. The firm must either generate this cash or convince the capital markets to supply it. In addition to the credibility of cash signals, dividends are also highly visible compared with other announcements. . . . Once dividends are initiated, shareholders apparently anticipate a periodic signal by management, and management is forced to submit to a periodic review. (p. 94)

Two recent studies by Venkatesh (1989) and Healy and Palepu (1988) report results that can be interpreted to support this view of why firms pay dividends. If dividend information is substitutable for earnings information, then earnings announcements before dividend initiation should convey more information than post-dividend initiation earnings announcements. Venkatesh finds that the average informativeness of quarterly earnings announcements (measured by the amount of price revaluation) decreases after dividend initiation. Healy and Palepu find that the price response to annual earnings information is lower in the years following dividend initiation.

I contend that the above results merely show that earnings and dividend information is substitutable. Demonstrating substitutability is not compelling evidence of the information transmission hypothesis. Why would a firm engage in costly information transmission via dividend payments when earnings reports will serve the same purpose. I argue that a firm would pursue an enhanced information transmission policy only if such a policy reduces the cost of information acquisition for investors. Firms for which it is relatively costly for investors to acquire information will have greater incentive to disclose information through dividends. **Consequently, if dividends augment the available public information about the firm, then the relative amount of private information acquisition after dividend initiation should decrease.**

I test the above information transmission hypothesis by comparing the average standardized variance of announcements from the pre- and post-dividend initiation periods. The use of standardized variances, i.e. announcement period variance divided by estimation period variance, avoids problems with changes in returns volatility. Standardized variance measures the amount of "new" information released at earnings and dividends announcements relative to the amount of information privately acquired during surrounding non-announcement periods. If dividend initiation alters the proportion of publicly available to privately acquired information, standardized variances of earnings and dividend announcements should increase after dividend initiation.

Further, one would expect firms with low information availability to experience the greatest increase in the relative informativeness of public announcements. To test this hypothesis, I use two proxies of information availability (namely, market value of equity and number of Wall Street Journal Index news items) to divide a sample of dividend initiating firms into five groups. I then test for differences, across groups, in the relative informativeness of these public announcements before and after dividend initiation.

The results from this study do not support the hypothesis that dividend initiation changes the relative amount of public versus private information. Further, I find no differential

changes in relative informativeness across samples of firms grouped by information availability.

If changes in information are not the basis for the findings that Venkatesh and Healy and Palepu report, then what is? Venkatesh finds that returns variability is lower in the post-dividend period. I present evidence that their results are driven by a contemporaneous decline in the returns volatility of firms initiating dividends. This decline leads Venkatesh and Healy and Palepu to interpret post-dividend initiation earnings announcements as being less informative. I investigate the nature of this returns volatility decline. I find no evidence that the decrease in returns volatility is driven by information related causes.

This paper is organized as follows. Chapter 2 develops the implications of the information transmission hypothesis. I critique the Venkatesh and Healy and Palepu studies within the framework of this hypothesis. I also discuss possible causes for the decline in returns volatility following dividend initiation. Chapter 3 presents my data and the methodology used to examine the information content of quarterly earnings. In Chapter 4, I report and discuss the results of tests on pre- and post-dividend initiation quarterly earnings. Chapter 5 presents tests on changes in returns volatility. Chapter 6 summarizes the results of this study.

CHAPTER 2
INFORMATION AND DIVIDEND INITIATION

Asquith and Mullins (1983) hypothesize that dividends may provide a vehicle for communicating management's superior information concerning the firm's current and future prospects. Information about a firm can come from two sources: information provided by the firm (publicly released information) and information privately acquired by investors. I assume that firms have a cost advantage in producing information about themselves. Therefore, managers prefer to release information publicly than have investors produce it at greater cost.[1]

One way dividends can transmit information to investors is by providing substantiation for the cash-flows reported in the earnings announcement. Without dividends, investors would have to seek substantiation from other costly sources. Venkatesh (1989) alludes to this argument in his paper. His explanation for the post-dividend decrease in returns volatility is that "investors accord less importance to pieces of 'information' (announcements/rumors) that could have induced price reactions in the pre-dividend period" (p. 176). **If dividends play an**

[1] It is not necessary to assume that managers do this for altruistic purposes. By reducing the costs of investigation, managers obtain a lower required rate of return.

informative role, the major testable implication is that private information acquisition will decrease in the post-dividend initiation period.[2] As the firm discloses a greater proportion of information through earnings and dividend announcements, investors have less incentive to acquire information privately. Therefore, the relative proportion of public versus private information will increase following dividend initiation. I make two assumptions to test this hypothesis. First, the information conveyed by dividends is substitutable for information imparted by earnings announcements. Second, the total amount of firm information does not change with dividend initiation.

Prior Empirical Work

Venkatesh (1989) studies a sample of 72 NYSE or AMEX firms that initiated quarterly dividend payments between 1972-1983. He collects the announcement dates of quarterly earnings and dividend payments for 14 quarters before and after dividend initiation. Using raw and excess returns from the earnings announcement as a measure of information content, he finds that the average information content of quarterly earnings announcements before dividend initiation is significantly greater. Based on this evidence, he concludes that earnings

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[2] The issues of information substitutability and its implications are formally explored in a rational expectations framework by Hellwig (1980), Diamond and Verrecchia (1981), Verrecchia (1982) and Bhushan (1989).

and dividend information are partially substitutable and that information is transmitted by dividends.

Venkatesh also finds that returns volatility is lower after dividend initiation. His explanation for this decrease is that investors in the post-dividend initiation period attribute less importance to information arriving during non-announcement periods. This leads to smaller price reactions and lower observed volatility. Venkatesh assumes that investors do not actively acquire information. Instead, they passively receive information and decide whether to act on this information. Before dividend initiation, they are more likely to act on non-announcement period information. In the post-dividend period, investors receive more publicly announced information and rely less on non-announcement period information.

The main focus of Healy and Palepu's (1988) study is to determine whether dividend initiations convey information about future earnings. They hypothesize that investors view dividend changes as management forecasts, substantiated by cash, of future earnings changes. So, dividend announcements enable investors to revise expectations of earnings. The forecast errors in earnings announcements following dividend initiation should therefore be reduced.

To test this hypothesis, they obtain the price response (namely, two-day cumulative excess returns) and earnings surprise (the earnings change standardized by price) for 5

annual earnings announcements prior to and following dividend initiation. They regress the price response on the earnings surprise to obtain the earnings response coefficient. This measures the informativeness of the earnings surprise. Other things being equal, earnings information that is unanticipated leads to large price revaluations and therefore to larger values of the earnings response coefficient. They find that the earnings response coefficient is lower in the post-dividend initiation period. Healy and Palepu argue that dividend initiation provides information which preempts subsequent earnings announcements.

Do Venkatesh's and Healy and Palepu's results regarding earnings provide support for the information transmission hypothesis? I argue they might not. These studies suggest that dividend and earnings information are substitutable. Managers have little motivation to initiate dividends if doing so merely shifts to dividends, information that would otherwise be conveyed by earnings. This is especially true since dividends are costly to investors. First, they are costly because dividends are taxed at ordinary income rates. If the firm chooses instead to retain earnings, taxes are reduced to the extent that capital gains are postponed. Second, dividends must be paid out of net income that would otherwise have been used for investment. Replacing this source of capital incurs transactions costs that are ultimately borne by investors. Third, initiating dividends also can lead to shifts in

clienteles that are costly to investors. Finally, there are costs of administering a dividend policy. Therefore, dividends must play a substantially greater informative role than documented by Venkatesh or Healy and Palepu to justify their cost.

I hypothesize that this greater role must be the increase in publicly released information and a consequent decrease in costly private information acquisition. The Venkatesh and Healy and Palepu studies cannot address this hypothesis for two reasons. First, in the post-dividend initiation, there are two routes through which public information is transmitted: dividends and earnings. A priori, we do not know how the total public information is divided between these two routes. By comparing only earnings announcements, the researcher is neglecting the amount of information conveyed by dividends. He can infer the effect of that information, but cannot quantify it. From inference, he can only conclude that dividend information has substituted for earnings information.

As an illustration, assume the total amount of available information is **a**. This amount remains constant for pre- and post-dividend initiation periods. Suppose that before dividend initiation, half (**a**/2) is publicly disclosed and half is privately acquired. After dividend initiation, earnings disclose **a**/3, dividends disclose **a**/3 and private acquisition accounts for the remaining third. We see that after dividend initiation, two-thirds of the information is publicly

disclosed. Yet if one observes only earnings all one can conclude is that the information content of earnings has declined from **a**/2 to **a**/3. We can conclude little about how much information was transmitted by dividends. Any attempt to gauge the relative proportion of public versus private information must examine the informativeness of both earnings and dividend announcements.

The second deficiency in the Venkatesh and Healy and Palepu studies lies in their information content measures. They base their measures on announcement period returns that do not account for the general reduction in returns volatility. This decrease in returns volatility may be due to causes unrelated to any information effect associated with dividend initiation. Suppose that announcement period returns variance decreases proportionally with the decrease in returns volatility. Then one would observe post-dividend initiation announcement returns that are lower in magnitude than pre-dividend initiation announcement returns. If this is so, one cannot distinguish a decrease in announcement period returns as being due to information related causes or otherwise. A study of the nature of changes in returns volatility around dividend initiation is called for. In the next section, I review several possible causes for a decrease in returns volatility.

Causes for Returns Volatility Decreases

Information related causes. In informationally efficient markets where new information is rapidly incorporated into price, returns volatility is directly related to the rate of information arrival. Lower volatility may be caused by a reduction in the rate at which information arrives. It is possible that when returns on the firm's underlying assets become less uncertain and more predictable, a decrease in returns volatility may occur. However, this effect does not depend on any changes in the process by which information is disseminated or processed about the firm. The decision to initiate dividends may coincide with the firm's asset returns becoming less uncertain. Decreases in returns volatility are then only coincidentally associated with dividend initiation. The initiation of dividends does not cause the rate of information arrival to decrease.

An alternative information related explanation for decreases in returns volatility is that dividend initiation reduces noise trading. Noise has been interpreted in various ways by Black (1986). I consider noise as the difference between the security's intrinsic value and its observed price. This mispricing occurs when traders over-react to the activities of other traders (French and Roll (1986)). Greater noise trading leads to higher volatility. Dividend initiation could reduce noise trading if it induces greater consensus among traders.

<u>The bid-ask spread.</u> Firms with large bid-ask spreads tend to have greater returns volatility. This relationship arises in several ways. First, the larger the bid-ask spread the larger the difference between buy and sell-side transactions. Observed returns are calculated using daily closing prices. If successive closing transactions are alternatively buy and sell transactions, they would be conducted at opposite edges of the bid-ask spread. Hence, the greater the bid-ask spread, the greater the observed return.

Bid-ask spreads increase with the dealer's inventory costs (Demsetz, 1968, Ho and Stoll, 1981) and the degree of informational asymmetry between informed traders and the uninformed dealer (Bagehot, 1971, Copeland and Galai, 1983, Glosten and Milgrom, 1985). It is possible that dividend initiation may alter these two factors and therefore reduce bid-ask spreads. For example, dividend initiation may increase trading volume. This reduces the dealer's inventory costs as inventory turnover increases. Dividend initiation may also reduce informational asymmetry through greater consensus between traders and dealers.

<u>Stock price.</u> Volatility decreases as stock price increases. This relationship occurs for two reasons. First, for the same bid-ask spread, higher priced stocks will have smaller observed returns and therefore lower volatility. For example, suppose stock A has bid and ask prices of 9 7/8 and 10 1/8,

respectively; stock B has bid and ask prices of 19 7/8 and 20 1/8. The bid-ask spread is 2/8 for both stocks. For successive sell and buy transactions the observed return for stocks A and B is 2.5% and 1.24%, respectively.

Second, as a firm's stock price increases (without the firm increasing debt), the firm's leverage decreases. Volatility is positively related to leverage. This can be easily seen by considering a firm in a Modigliani-Miller world with no taxes and riskless debt. The return on a leveraged firm k_S is

$$k_S = k_V + (k_V - r)\left(\frac{D}{S}\right)$$

where r is the riskless interest rate and k_V is the return on the unleveraged firm. The market value of debt and equity is D and S, respectively. Taking variances

$$\sigma_S = \sigma_V\left(1 + \frac{D}{S}\right)$$

Therefore, stock volatility σ_S depends positively on leverage D/S.

Interest rates. Volatility also changes with interest rates. Interest rates indirectly affect volatility through leverage. An increase in interest rates can both increase or decrease leverage. First, as interest rates rise, the value of both debt and equity both decline but equity declines proportionately greater than debt; this leads to an increase in leverage. Second, there is a wealth transfer from bond to

equity holders that decreases leverage. Christie (1982) has studied the net effect of interest rates on leverage. He finds that high interest rates are associated with high returns volatility.

If dividend initiation has information related effects, volatility can decrease due to reductions in noise trading and bid-ask spreads. Volatility can also decrease due to factors unrelated to information effects. The returns on the assets of firms initiating dividends could have become less uncertain and thus prices are less volatile. Dividend initiating firms could experience increases in stock price which lead to proportionally smaller bid-ask spreads and reduced leverage. Finally, returns volatility can decrease due to market wide changes in interest rates.

CHAPTER 3
DATA AND METHODOLOGY

Data

My data sample consists of 332 firms that initiated dividends between 1970-1986 inclusive. These firms were identified by scanning the 1988 Center for Research in Security Prices (CRSP) NYSE/AMEX and NASDAQ files. I also collect earnings information for approximately 14 quarters (900 trading days) before and after the initial dividend. These were obtained from the 1987 quarterly Compustat files and/or the Wall Street Journal Index. To be included in the sample, firms must meet the following requirements.

(1) The initiating dividend is either the first dividend in the firm's corporate history or the resumption of dividend payments after a hiatus of at least 10 years. The initial dividend cannot be an extra or special dividend.

(2) The firm must continue paying dividends for at least three years after the initial dividend.

(3) The firm must have 3 years of daily returns data before and after the initial dividend.[1]

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[1] Not all the returns data for the 3 year period preceding and following dividend initiation are obtained from one CRSP tape source. Fourteen firms which were on the NASDAQ

(4) One year must elapse between the firm's initial appearance on the NYSE/AMEX or NASDAQ tapes and the announcement of it's initial dividend.

(5) In each 14 quarter period preceding and following the initial dividend, announcement dates and earnings and price data for at least 10 quarters must be available. This eliminates firms that only report annual earnings or firms merged out of existence.

Table 1 presents an overview of the sample. Most of the dividend initiations occurred in the middle seventies. Almost 65% of the sample initiated dividends between 1975 and 1977. This could be due to the relaxation of the Nixon price controls or to cross-sectional dependence in earnings changes as posited by Marsh and Merton (1987). More than three-quarters of the sample paid at least 9 dividends in the 14 quarters following dividend initiation. The most common dividend payment frequency was quarterly, followed by half yearly and annual payments. American Exchange listed firms form a slight majority followed by New York Stock Exchange and OTC firms. More than 90% of the sample had at least 5 years of quarterly earnings data.

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tape when they initiated dividends had continuing data on the NYSE/AMEX tape. Similarly, 6 firms which were on the NYSE/AMEX tape when they initiated dividends had prior NASDAQ data.

TABLE 1
OVERVIEW OF SAMPLE CHARACTERISTICS

				Cumulative	
		Freq.	Percent	Freq.	Percent
Year of Dividend Initiation	1970	6	1.8	6	1.8
	1971	4	1.8	10	3.0
	1978	12	5.4	23	8.4
	1973	31	6.3	59	17.8
	1970	27	8.1	86	25.9
	1975	62	18.7	148	44.6
	1979	70	21.1	218	65.7
	1977	49	24.8	267	80.4
	1978	23	6.9	290	87.3
	1979	12	3.6	332	98.0
	1986	9	2.7	311	93.7
	1981	6	1.8	317	95.5
	1982	9	1.5	322	97.0
	1983	6	1.8	328	98.8
	1986	4	1.2	332	100.0
Number of Dividends[a]	2-4	26	7.8	26	7.8
	5-8	50	15.1	86	22.9
	9-12	53	16.0	129	38.9
	13-16	203	61.1	332	100.0
Dividend Payment Frequency[b]	Annual	21	6.3	21	6.3
	Half	35	10.5	56	16.9
	Quarter	217	65.4	273	83.2
	Other[c]	59	17.8	332	100.0

TABLE 1 -- continued

		Freq.	Percent	Cumulative Freq.	Cumulative Percent
Exchange[d]	NYSE	104	31.3	104	31.3
	AMEX	143	43.1	247	74.4
	NASDAQ	85	25.6	332	100.0
Number of Quarterly Earnings[e]	16-19	12	3.6	12	3.6
	20-23	42	12.7	54	16.3
	24-27	105	31.6	159	47.9
	28-30	173	52.1	332	100.0

[a] Number of dividends which were declared within 900 trading days following the initial dividend.

[b] The frequency of dividend payments in the 3 year period following dividend initiation.

[c] Within the 3 year period following dividend initiation, 5 firms changed from an annual to a half yearly payment frequency. 6 firms changed from annual to quarterly. 44 firms changed from half yearly to quarterly. 1 firm changed from quarterly to half yearly. 2 firms changed from annual to half yearly to quarterly. 1 firm changed from half yearly with additional year-end dividends to quarterly.

[d] Exchange on which firm was trading when dividends were initiated.

[e] Number of quarters within 900 trading days of the declaration of the initial dividend for which earnings information was available.

Tests on Quarterly Earnings

Measuring information content. The information content of an earnings announcement is computed in the following way. The announcement period consists of 3 trading days: the day of the announcement (day t), the day preceding (t-1) and following (t+1) the announcement date. Beginning at days t-2 and t+2, returns for 60 days surrounding the announcement period are

collected. These returns form the non-announcement period. If dividends and other earnings announcements occur within this non-announcement period, the returns from these announcements are excluded.

The 60 non-announcement period returns are used to estimate the market model for firm j:

$$R_{j\tau} = \alpha_j + \beta_j R_{m\tau}, \qquad \tau = 1,60$$

where $R_{j\tau}$ are the returns on day τ for the firm j, $R_{m\tau}$ are the returns (including dividends) of a value-weighted index for all firms on the tape, and α_j and β_j are OLS estimated coefficients. Excess returns $u_{j\tau}$ are calculated as

$$u_{j\tau} = R_{j\tau} - (\alpha_j + \beta_j R_{m\tau})$$

I assume that excess returns are normally distributed with zero expected value.

Three measures of information content are used. The first is the standardized variance, a variant of Beaver's U (see Beaver, 1968). It is denoted by BVU. This is the ratio of announcement period returns variance to non-announcement period returns variance. Beaver's U is a measure of the "new" or marginal information conveyed to the market by the earnings (and dividends) announcement relative to the average information available during the non-announcement period. It is also a measure of the relative amounts of publicly disclosed versus privately acquired information. I assume that non-announcement period returns variances capture the extent

of private information acquisition. This may not be strictly true as firms may engage in other forms of public disclosure, for example, earnings forecasts. However, their effect is minimized if dividend initiation does not systematically lead to changes in the firm's other public disclosures.

The use of standardized variances also controls for changes in returns volatility. This is critical under two sets of circumstances. First, if the market were generally more variable during a certain period, a direct comparison of announcement period returns would bias the test of firm-specific price response to earnings announcements. This bias is exacerbated if the sample is clustered in calendar time and clustering is coincident with changes in market volatility. Second, if there is a systematic decrease in returns volatility contemporaneous with dividend initiation. Standardizing the announcement period returns variance by the non-announcement period returns variance avoids problems that may arise from differences in volatility. I suspect that previously reported results may be driven by returns variance decreases and not by changes in information transmission.

Let A represent the set of announcement period days and N represent the set of 60 non-announcement period days. I estimate the announcement period returns variance to be the sum of the squared excess returns u_τ ($\tau \in A$) divided by the number of days within the announcement period, T_A. Similarly, the non-announcement period returns variance is the sum of 60

squared excess returns u_τ ($\tau \in N$) divided by 60. The standardized variance is calculated as

$$BVU_j = \frac{Var[u_{j\tau}, \tau \in T_A]}{Var[u_{j\tau}, \tau \in T_N]} = \frac{\frac{1}{T_A}\sum_{\tau \in T_A} u_{j\tau}^2}{\frac{1}{T_N}\sum_{\tau \in T_N} u_{j\tau}^2}$$

Standardized variance is calculated for two definitions of the announcement period. In the first definition, BVU_E, the announcement period consists only of the earnings announcement. This definition is used for comparison with Venkatesh's results. As BVU_E measures the marginal information content of earnings relative to the average information in the non-announcement period, this ratio is used to examine the substitutability of earnings and dividend information. Decreases in post-dividend initiation BVU_E's indicate that dividend announcements have preempted earnings announcements.

In the second definition, BVU_D, the announcement period consists of the earnings announcement and the nearest dividend announcement occurring within 30 days of the earnings announcement. This definition is used to measure the total effect of dividends as a public disclosure mechanism. In the post-dividend initiation period, information is publicly disclosed through both dividends and earnings. In each quarter, BVU_D measures the information content of all public disclosures (from both earnings and dividends) relative to private information. Increases in post-dividend initiation

BVU_D's indicate that more information is released publicly than acquired privately.

I also calculate two measures which are based on announcement period returns. They are similar to those used by Venkatesh. They are measures of price revaluations induced by information released at earnings announcements. These measures do not take into account non-announcement period returns and therefore, the general level of returns variability. The first measure, RAW, is the absolute value of the sum of earnings announcement period returns.

$$RAW_j = \left| \sum_{\tau=t-1}^{t+1} R_{j\tau} \right|$$

The second, MAJ, is the absolute value of the sum of earnings announcement period excess returns.

$$MAJ_j = \left| \sum_{\tau=t-1}^{\tau=t+1} u_{j\tau} \right|$$

These measures differ only to the extent that the market model regression accounts for contemporaneous market movements. Because the explanatory power of market model regressions is typically low, these measures are quantitatively very similar. The values for MAJ are usually slightly smaller in magnitude than those obtained with RAW.

I define the pre- and post-dividend windows to be 900 day periods (about 14 quarters) preceding and following the initiation of dividends. A "joint" announcement occurs when

a dividend is declared within 2 days of an earnings announcement. I follow Venkatesh in excluding joint announcements from the analysis. I require that in each window, there are at least 3 usable earnings announcements. This requirement eliminates 7 firms from the sample. The final sample consists of 325 firms.

For each firm j, I average the information content measures of all pre- and post-dividend initiation quarters. "Matched differences" are obtained by subtracting the average post-dividend initiation information content from the average pre-dividend initiation information content for each firm.

$$
\begin{aligned}
DRAW_j &= \overline{RAW}_{j,PRE} - \overline{RAW}_{j,POST} \\
DMAJ_j &= \overline{MAJ}_{j,PRE} - \overline{MAJ}_{j,POST} \\
DBVU_{E,j} &= \overline{BVU}_{j,PRE} - \overline{BVU_{E}}_{j,POST} \\
DBVU_{A,j} &= \overline{BVU}_{j,PRE} - \overline{BVU_{A}}_{j,POST}
\end{aligned}
$$

The distribution of matched differences is then analyzed to detect the effect of dividend initiation.

<u>Hypotheses and test statistics.</u> There are 2 main hypotheses. The first is that dividend information is substitutable to earnings information. Under this hypothesis, one would expect to observe raw price reactions of earnings announcements to decrease in the post-dividend period. Therefore the appropriate test is

H_0 : DRAW = 0 versus H_a : DRAW > 0 and

H_0 : DMAJ = 0 versus H_a : DMAJ > 0.

Further, if the total amount of information or the general level of volatility does not increase from pre-to post-dividend initiation periods, then the standardized variance measure of information content should also decrease.

H_0 : $DBVU_E$ = 0 versus H_a : $DBVU_E$ > 0.

The second hypothesis is that dividends augment the transmission of public information about the firm. Under this information transmission hypothesis, the relative information content of public announcements (both earnings and dividends) to private information should increase. Therefore,

H_0 : $DBVU_D$ = 0 versus H_a : $DBVU_D$ < 0.

These hypotheses are tested using standard t statistics and Wilcoxon signed-rank statistics. The nonparametric Wilcoxon signed-rank test (for example, see Hollander and Wolfe, 1973) is particularly suited to the case of paired replicates data i.e. pairs of pre- and post-treatment observations, where we are concerned with a shift in location due to the application of the treatment. In this case, the treatment is the payment of dividends. Nonparametric techniques require few assumptions

about the underlying populations from which the data are obtained. In particular, nonparametric procedures forego the traditional assumption that the underlying populations are normal.

The Wilcoxon signed-rank statistic W is calculated as follows. The absolute values of the matched differences are ranked in ascending order. The ranks of those matched differences that have the sign of the hypothesized direction (i.e. DRAW>0, DMAJ>0, $DBVU_E>0$ and $DBVU_D<0$) are summed. Denote this sum as T^+. I use the large sample approximation to obtain W.

$$W = \frac{T^+ - \left[\frac{n(n+1)}{4}\right]}{\sqrt{\frac{n(n+1)(2n+1)}{24}}}$$

The statistic has an asymptotic standard normal distribution. For a two tailed test, the null hypothesis is rejected if $|W| > z(\alpha/2)$, where $z(.)$ denotes the standard normal variable and α the significance level.

<u>Differential information availability.</u> I also test the information transmission hypothesis by examining whether firms grouped by information availability have different information content of earnings announcements. **If information transmission is a valid incentive for initiating dividends, then one would expect firms with low information availability to experience**

the greatest increase in the relative informativeness of public announcements. To test this hypothesis, I group firms using two proxies of information availability (namely, market value of equity and number of Wall Street Journal Index news items). I test for group differences in the informativeness of these public announcements before and after dividend initiation.

Previous studies by Shores (1990), Bhushan (1989), Lobo and Mahmoud (1989), Atiase (1985), Zeghal (1984) and Grant (1980) consistently find that the earnings announcements for firms with low information availability have greater information content. These studies group their sample firms on proxies of information availability such as firm size, analyst following, trading volume, exchange listing, financial media reportage, number of market makers and bid-ask spread. The most commonly used proxy of information availability is market size. For example, Shores (1990), Lobo and Mahmoud (1989), Bhushan (1989), Atiase (1985) and Zeghal (1984) all report that the earnings announcements of large market capitalization firms have lower information content. This is because large firms already have more information available about them and the additional contribution of earnings information is smaller.

Large firms have greater information availability due to several reasons. Large firms may have economies of scale in producing and disseminating information about themselves. Large companies also produce more information to meet

regulatory requirements. Large firms tend to have more shareholders. A large shareholder base provides incentive for third-party information providers such brokerage services, financial news-letters, etc., to produce information about the firm.

I standardize the firm's market value of equity by the total market value to obtain adjusted firm size. Standardization takes into account the general market capitalization. Standardization may be important if information collection depends not on the magnitude of market capitalization but on the ranking of the firms relative to the total universe of firms. Relative rankings will change as the total market value changes over time. Since our sample covers a long period,[2] any secular change in total market value may be important. It turns out that standardization does not alter the group rankings greatly. Out of 332 firms, 32 firms change groups when ranked by market value of equity alone.

The firm's adjusted firm size is calculated as the total number of shares outstanding (SHR) multiplied by the price two days before the first dividend is declared (P_{t-2}). This figure is then divided by the total dollar value of all non-ADR securities (TOTMV) and multiplied by a scaling factor of 1,000,000.

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[2] Studies which have used firm size have covered a shorter period over which changes in total market value may be minimal.

$$\text{Adjusted Firm Size} = \frac{SHR \times P_{t-2}}{TOTMV} \times 1{,}000{,}000$$

Price data and number of shares outstanding are obtained from the CRSP tapes. Prior to 1973, total market dollar value is for NYSE and AMEX listed securities. From 1973, NASDAQ-traded stocks are included.

The number of news items appearing in the Wall Street Journal Index measures the occurrence of events that have informative value. It is also a measure of financial media coverage. A firm with a high number of news items is assumed to have higher information availability. For each firm in the sample, the number of news items appearing in the Wall Street Journal Index during the year prior to the declaration of the first dividend is collected.

The firms in my sample are ranked in ascending order by adjusted firm size and the number of news items and then divided into five groups. Note that the groups based on news items do not have equal numbers of firms. This is because the number of news items is discrete causing clustering. For example, firms in the third group all have 8 news items. The characteristics of the information availability groups are shown in Tables 2 and 3. There appears to be sufficient variation with respect to firm size. For the adjusted firm size groups, the mean market value of equity is approximately two times greater than the preceding group.

TABLE 2
CHARACTERISTICS OF GROUPS BASED ON ADJUSTED FIRM SIZE

Group	N	Var	Mean	SD	Min	Med	Max
1	66	SIZE[a]	6.563	2.396	2.860	6.399	15.587
		NEWS[b]	6.833	2.271	2	6	16
2	67	SIZE	13.144	3.558	6.274	13.052	24.820
		NEWS	7.667	2.420	4	7	18
3	67	SIZE	23.303	6.088	10.621	22.727	38.900
		NEWS	9.552	4.328	5	9	33
4	66	SIZE	50.667	17.750	26.837	45.794	127.630
		NEWS	10.797	5.262	5	9	28
5	66	SIZE	308.83	584.906	50.474	128.265	3631.92
		NEWS	13.078	7.895	5	10	50

[a] SIZE is the market value of equity (in millions of dollars) two days before the initial dividend is announced.
[b] NEWS is the number of Wall Street Journal Index news items in the year prior to the announcement of the initial dividend.

Table 4 shows the distribution of firms grouped by firm size and news items. While the information proxies do not yield identical groupings, large firms tend to have more news items reported about them. This is consistent with the findings of Thompson, Olsen and Dietrich (1987) who examine the characteristics of Wall Street Journal Index news items.

TABLE 3
CHARACTERISTICS OF GROUPS BASED ON NUMBER OF NEWS ITEMS

Group	N	Var	Mean	SD	Min	Med	Max
1	48	SIZE[a]	23.727	26.846	2.860	14.018	138.52
		NEWS[b]	4.826	0.5698	2	5	5
2	92	SIZE	43.899	91.479	2.880	13.312	512.290
		NEWS	6.424	0.497	6	6	7
3	46	SIZE	25.242	22.562	4.020	15.970	82.357
		NEWS	8	0	8	8	8
4	79	SIZE	46.317	47.877	3.294	27.547	297.024
		NEWS	9.397	0.952	9	10	12
5	67	SIZE	238.728	586.243	10.621	55.544	3631.920
		NEWS	17.657	6.383	13	16	50

[a] SIZE is the market value of equity (in millions of dollars) two days before the initial dividend is announced.

[b] NEWS is the number of <u>Wall Street Journal Index</u> news items in the year prior to the announcement of the initial dividend.

TABLE 4
DISTRIBUTION OF FIRMS IN GROUPS BASED ON ADJUSTED FIRM SIZE AND NUMBER OF NEWS ITEMS

		NEWS ITEMS					
		1	2	3	4	5	Total
ADJUSTED MARKET VALUE	1	17	28	10	9	2	66
	2	11	27	13	13	3	67
	3	9	13	7	26	12	67
	4	8	11	11	17	19	66
	5	3	13	5	14	31	66
Total		48	92	46	79	67	332

To test for differential information contents across the five groups the data sample is characterized as a one-way layout design experiment. The data consists of $N = \Sigma_k n_k$ (for k=1,...,5) observations with n_k observations in the kth information availability group. Note that the number of observations in each group need not be equal to each other. This one-way layout is illustrated in Figure 3.1. D(j,k)'s are the matched differences from group k with j individual observations.

Information Availability Groups

1	2	3	4	5
D(1,1)	D(1,2)	D(1,3)	D(1,4)	D(1,5)
D(2,1)	D(2,2)	D(2,3)	D(2,4)	D(2,5)
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	$D(n_4,4)$	.
.	$D(n_2,2)$	.		.
$D(n_1,1)$		.		$D(n_5,4)$
		$D(n_3,3)$		

Figure 1
Sample Data Design

The basic model is

$$D(j,k) = \mu + \tau_k + e_{jk}, \qquad j=1,\ldots,n_k \qquad =1,\ldots,5$$

where μ is the unknown overall mean, τ_k is the unknown information effect in group k. I assume the errors e are mutually independent and have the same continuous distribution.

The hypothesis to be tested is

$$H_0 : \tau_1 = \tau_2 = \tau_3 = \tau_4 = \tau_5 \qquad \text{versus}$$

$$H_a : \tau_1 \geq \tau_2 \geq \tau_3 \geq \tau_4 \geq \tau_5$$

where at least one of the inequalities is strict. The firms in the lower information availability groups have larger information effects.

I use the Jonckheere-Terpstra statistic (see Hollander and Wolfe, 1973) to test the hypothesis. It is based on the number of group j observations which are less than each of the group i observations, where i > j. For 5 groups, there are 10 of these Mann-Whitney counts U_{ij}.

$$U_{ij} = \sum_{s=1}^{n_i} \sum_{t=1}^{n_j} \phi[D(s,i)\ D(t,j)]$$

where $\phi(a,b) = 1$ if $a<b$, 0 otherwise. Let J_T be the sum of the Mann-Whitney counts. The stronger are the group effects, the larger is J_T. The large sample approximation J is

$$J = \frac{J_T - [N^2 - \sum_{k=1}^{5} n_k^2]/4}{\sqrt{\frac{1}{72}[N^2(2N+3) - \sum_{k=1}^{5} n_k^2(2n_k+3)]}}$$

It has an asymptotic N(0,1) distribution.

In addition, I use the Kruskal-Wallis (see Hollander and Wolfe, 1973) statistic to detect if there any differences in τ across groups. The alternative hypothesis is that the τ's are not all equal. It is based on the ranks of sample observations. All matched differences in the sample are ranked in ascending order. These ranks are then divided into their groups and summed. Let r_k be the sum of the ranks of the observations in group k. The Kruskal-Wallis statistic H is given by

$$H = \frac{12}{N(N+1)} \sum_{k=1}^{5} \frac{r_k^2}{n_k} - 3(N+1)$$

For large samples, H has an asymptotic chi-squared distribution with k-1 degrees of freedom.

The above tests are equivalent to parametric analysis of variance F tests. However, when the distributions of matched differences are not normal, the use of F statistics is inappropriate. Further, the Jonckheere-Terpstra test is a

comprehensive test which does not suffer from the usual problems associated with multiple comparisons such as the Bonferroni or Tukey methods.

CHAPTER 4
TESTS ON QUARTERLY EARNINGS ANNOUNCEMENTS

The Overall Sample

The overall sample consists of 325 firms. Each firm must have at least 3 usable quarterly earnings (joint announcements are omitted) in both pre- or post-dividend initiation periods. For each firm, the information content of quarterly earnings announcements in each period are averaged. Summary statistics for the cross-sectional distribution of average information content measures for pre- and post-dividend initiation periods are shown in Table 5. The information content measures are based on raw returns (RAW), market adjusted excess returns (MAJ), the ratio of earnings announcement returns variance to non-announcement returns variance (BVU_E) and the ratio of earnings and dividend announcement returns variance to non-announcement period returns variance (BVU_D). In the pre-dividend initiation period, only earnings announcements are relevant and the ratio is with respect to earnings announcement returns variance (BVU).

The information content measures RAW and MAJ have larger values in the pre-dividend initiation period. The pre-dividend initiation values of the minimum, the first quartile, median, third quartile and maximum always exceed those from the post-

TABLE 5
DISTRIBUTION OF THE AVERAGE INFORMATION CONTENT OF QUARTERLY EARNINGS ANNOUNCEMENTS BEFORE AND AFTER DIVIDEND INITIATION.

	Sample Size = 325 firms						
	Pre-Dividend Period			Post-Dividend Period			
	RAW	MAJ	BVU	RAW	MAJ	BVU_E	BVU_D
Mean	5.79	5.67	2.007	4.52	4.39	1.908	1.862
SD	2.13	2.15	1.139	1.62	1.62	1.178	1.444
Minimum	1.14	1.52	0.459	0.02	0.85	0.230	0.528
Q1[a]	4.29	4.13	1.309	3.42	3.34	1.173	1.205
Median	5.61	5.43	1.684	4.36	4.15	1.609	1.573
Q3[a]	6.98	6.89	2.263	5.35	5.25	2.367	2.036
Maximum	13.31	12.82	7.663	11.65	11.43	9.589	15.081

[a] Q1=first quartile; Q3=third quartile.

dividend initiation period. For pre-dividend initiation quarterly earnings announcements, the mean raw price revaluation is 5.79%. For post-dividend initiation quarterly earnings announcements, the mean is 4.52%. Similarly, the pre-dividend initiation mean market adjusted price revaluation is 5.67% with the post-dividend initiation mean being 4.39%.

These figures are similar to those reported by Venkatesh.[1] For raw returns, Venkatesh obtains a pre-dividend initiation

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[1] The differences between my study and the Venkatesh study are as follows. Venkatesh examines a smaller sample of 75 NYSE or AMEX firms which paid quarterly dividends. His estimation period precedes the quarterly earnings announcement date. He uses a lagged Scholes-Williams technique to obtain his market model regressions.

mean of 5.84%. In the post-dividend initiation period, he reports a mean of 4.91% (4.01%) for earnings announcements following (preceding) dividends announcements. Results for market adjusted excess returns are similarly comparable.

The standardized variance information content measures show a lesser decrease. The post-dividend initiation mean values for BVU_E and BVU_D are 1.908 and 1.862 compared with the pre-dividend initiation mean value of 2.007. For the post-dividend initiation period, the average dividend announcement variance is less than the average earnings announcement variance. Thus the combined average variance of earnings and dividend announcement (BVU_D) is less than for earnings announcements alone (BVU_E).

Whether these differences are statistically significant is examined by comparing matched differences. The distribution for matched differences is tabulated in Table 6. I use t statistics and the nonparametric Wilcoxon signed-rank statistics to test whether the average information content is greater in the pre-dividend initiation period. The evidence for RAW and MAJ is unambiguous. Both t and Wilcoxon signed-rank tests support the hypothesis that the average post-dividend initiation quarterly earnings announcement is less informative. About 70% of the sample experiences a decrease in earnings price informativeness. The average reduction is about 1.2%. This suggests that earnings and dividend information

might be substitutable. My sample yields results entirely consistent with those reported by Venkatesh.

The results from the standardized variance measures of information content measures are in less accordance with the raw price measures. Just over half the sample experience a decrease following dividend initiation. $DBVU_E$ has an insignificant decline. Thus, there appears to be a reduction in the informativeness of earnings announcements relative to the average informativeness in non-announcement days. More importantly, however, $DBVU_D$ has a significant change but it is in a direction opposite to that hypothesized. The variance of excess returns for public announcements (both earnings and dividends announcements) relative to the non-announcement periods is decreased once dividends have been initiated. Contradictory to the information transmission hypothesis, the proportion of information publicly released relative to that privately acquired **decreases** after dividend initiation.

I also test the normality of the distribution of the matched differences of information content measures. The lower the value of the Shapiro-Wilk D statistic the greater the probability of rejecting the null hypothesis that the distribution is normal. The null is rejected at the 5% significance level for all distributions. The non-normality of the distributions of matched differences justifies the use of nonparametric test statistics.

TABLE 6
CROSS-SECTIONAL DISTRIBUTION OF MATCHED DIFFERENCES

	Sample Size = 325 firms			
	DRAW[a]	DMAJ[a]	$DBVU_E$[a]	$DBVU_D$[a]
Mean	1.27	1.29	0.099	0.145
Std. Dev.	2.53	2.51	1.546	1.729
Minimum	-6.99	-6.51	-7.098	-13.632
Q1[b]	-0.15	-0.36	-0.785	-0.503
Median	1.37	1.23	0.048	0.114
Q3[b]	2.76	2.95	0.873	0.907
Maximum	9.17	9.80	6.237	6.518
D[c]	0.9654	0.9695	0.9364	0.8367
Prob < D	0.0368	0.0421	0.0000	0.0000
No. Positive	241	226	170	177
% Positive	77.2	69.5	52.3	54.5
T[d,e]	9.05	9.24	1.15	1.52
Prob > T	0.0001	0.0001	0.1250	0.0654
W[d,f]	8.42	8.46	1.17	2.82
Prob > W	0.0001	0.0001	0.1210	0.0024

[a] Difference of average pre- and post-dividend information content of quarterly earnings, for each firm. For example, for the raw price information content measure,

$$DRAW_j = \overline{RAW}_{j,PRE} - \overline{RAW}_{j,POST}$$

[b] Q1=first quartile; Q3=third quartile.
[c] Shapiro-Wilk test of H_0: Distribution is normal.
[d] Test of H_0: DRAW=0 versus H_a: DRAW>0,
H_0: DMAJ=0 versus H_a: DMAJ>0,
H_0: $DBVU_E$=0 versus H_a: $DBVU_E$>0,
H_0: $DBVU_D$=0 versus H_a: $DBVU_D$>0.
[e] t-statistic.
[f] Wilcoxon signed-rank statistic.

The Sample Grouped by Information Availability

In this section, I analyze the matched differences across information availability groups. Under the information transmission hypothesis, one would expect to see the informativeness of earnings announcements to decrease as one goes from low information availability to high information availability firms. Table 7 shows the distribution of DRAW grouped by adjusted firm size. For all groups, the differences are significantly positive. The Wilcoxon signed-rank tests and t-tests are significant at levels well below the 5% level. The Kruskal-Wallis H statistic indicates that the group means for DRAW do differ across groups. The Jonckheere-Terpstra J statistic indicates that the group means are decreasingly smaller as market value increases. This relationship is significant at the 5% level. Post-dividend initiation quarterly earnings average price revaluations are less than in the pre-dividend initiation period. An examination of the group means shows that the decrease tends to be less for high market value firms. Low market value firms experience a drop of 1.5% in the average revaluation occurring at earnings announcements. High market value firms experience only a 0.6% decrease. However, this relationship is not strictly monotonic. Firms in the lowest market value group have smaller decreases than those in the next quintile.

Table 8 shows the distribution of DMAJ grouped by adjusted firm size. We obtain the same general results with DMAJ. The

group means decrease from group 2 to group 5. The mean for group 1 is less than that of group 2. The difference between group means is less strong than for DRAW.

Tables 9 and 10 show the distributions for the standardized variance measures. In general, there does not appear to be any significant change in means after dividend initiation. P-values for the t-tests and Wilcoxon signed rank tests are generally insignificant. The only exception to this is group 2 for $DBVU_D$ which shows a decrease. The Kruskal-Wallis statistics fail to reject the null hypothesis of equal group means. The Jonckheere-Terpstra statistics do not provide any evidence that changes in relative informativeness increases as one goes from smaller to larger firms.

Tables 11 to 14 show the distributions of matched differences for the groups based on number of <u>Wall Street Journal Index</u> news items. In general, the results obtained from using this information availability proxy are similar to those obtained from adjusted firm size. Within groups, the t and W statistics show that the mean matched differences for DRAW and DMAJ are all greater than zero at conventional significance levels. The Kruskal-Wallis statistic shows that the group means are not all equal. The Jonckheere-Terpstra statistic shows that groups with more news items have smaller mean decreases.

TABLE 7
DISTRIBUTION OF DRAW FOR PORTFOLIOS BASED ON FIRM SIZE

	FIRM SIZE PORTFOLIOS (1=SMALL, 5=LARGE)				
	1	2	3	4	5
N	65	64	67	66	63
Minimum	-6.9927	-4.7255	-5.6859	-5.3322	-3.6112
Q1[a]	0.0597	-0.1516	0.1686	-0.2734	-0.8354
Median	1.7415	1.7134	1.7880	1.0386	0.4658
Q3[a]	3.2472	3.5687	2.8520	2.2331	1.7973
Maximum	9.1723	8.4802	7.7009	6.5617	6.2081
Mean	1.4319	1.6038	1.5852	1.0865	0.6213
SD	3.1280	2.5617	2.3125	2.3807	2.0822
T	3.69	5.01	5.61	3.71	2.37
Pr > |T|	0.0005	0.0001	0.0001	0.0001	0.0210
W	3.76	4.29	4.87	3.39	2.18
Pr > |W|	0.0001	0.0001	0.0001	0.0006	0.0292
H[b]	9.6564*				
J[c]	2.6670*				

[a] Q1=first quartile; Q3=third quartile.
[b] Test of H_0: $\tau_1=\tau_2=...=\tau_5$ versus H_a: at least one mean (τ) is not the same. H is the Wallis-Kruskal statistic. Cannot reject the null at the 5% level if H<9.49.
[c] Test of H_0: $\tau_1=\tau_2=...=\tau_5$ versus H_a: $\tau_1\geq\tau_2\geq...\geq\tau_5$ with at least one strict inequality. J is the Jonckheere-Terpstra statistic. Cannot reject the null at the 5% level if J<1.645.
* Significant at the 5% level using a one-tailed test.

TABLE 8
DISTRIBUTION OF DMAJ FOR PORTFOLIOS BASED ON FIRM SIZE

	FIRM SIZE PORTFOLIOS (1=SMALL, 5=LARGE)				
	1	2	3	4	5
N	65	64	67	66	63
Minimum	-6.1745	-6.5091	-3.5399	-4.8611	-2.8960
Q1[a]	-0.1286	-0.5404	0.1559	-0.5313	-0.8236
Median	1.3908	1.8688	1.4322	0.7621	0.5403
Q3[b]	2.5956	3.8226	3.0869	2.9983	1.9154
Maximum	9.8017	8.5145	7.4536	6.4123	5.4624
Mean	1.2713	1.6674	1.6423	1.1678	0.6[illegible]91
SD	2.9604	2.7884	2.2282	2.4313	1.9437
T	3.46	4.78	6.03	3.90	2.69
Pr > |T|	0.0010	0.0001	0.0001	0.0002	0.0091
W	3.52	4.19	5.08	3.35	2.36
Pr > |W|	0.0004	0.0001	0.0001	0.0008	0.0182
H[c]	7.2795				
J[d]	2.0676*				

[a] Q1=first quartile; Q3=third quartile.

[b] Test of H_0: $\tau_1=\tau_2=...=\tau_5$ versus H_a: at least one mean (τ) is not the same. H is the Wallis-Kruskal statistic. Cannot reject null at the 5% level if H<9.49.

[c] Test of H_0: $\tau_1=\tau_2=...=\tau_5$ versus H_a: $\tau_1\geq\tau_2\geq...\geq\tau_5$ with at least one strict inequality. J is the Jonckheere-Terpstra statistic. Cannot reject the null at the 5% level if J<1.645.

* Significant at the 5% level using a one-tailed test.

TABLE 9
DISTRIBUTION OF $DBVU_E$ FOR PORTFOLIOS BASED ON FIRM SIZE

	FIRM SIZE PORTFOLIOS (1=SMALL, 5=LARGE)				
	1	2	3	4	5
N	65	64	67	66	63
Minimum	-7.0975	-2.8549	-3.3461	-2.3720	-2.8119
Q1[a]	-1.0527	-0.7551	-0.9388	-0.6734	-0.5887
Median	-0.1229	0.2910	0.0761	0.1267	-0.0641
Q3[a]	0.9738	1.0409	0.9714	0.6136	0.8085
Maximum	5.4849	4.8623	6.2366	3.5934	2.4277
Mean	-0.2467	0.3007	0.2396	0.1151	0.0835
SD	2.2479	1.4633	1.6395	1.0479	0.9478
T	-0.88	1.64	1.20	0.89	0.70
Pr > |T|	0.3797	0.1051	0.2359	0.3756	0.4868
W	-0.49	1.26	0.67	0.61	0.55
Pr > |W|	0.6242	0.2076	0.5028	0.5418	0.5824
H[b]	1.6994				
J[c]	-0.3855				

[a] Q1=first quartile; Q3=third quartile.

[b] Test of H_0: $\tau_1=\tau_2=...=\tau_5$ versus H_a: at least one mean (τ) is not the same. H is the Wallis-Kruskal statistic. Cannot reject the null at the 5% level if $H<9.49$.

[c] Test of H_0: $\tau_1=\tau_2=...=\tau_5$ versus H_a: $\tau_1\geq\tau_2\geq...\geq\tau_5$ with at least one strict inequality. J is the Jonckheere-Terpstra statistic. Cannot reject the null at the 5% level if $J<1.645$.

TABLE 10
DISTRIBUTION OF $DBVU_D$ FOR PORTFOLIOS BASED ON FIRM SIZE

	FIRM SIZE PORTFOLIOS (1=SMALL, 5=LARGE)				
	1	2	3	4	5
N	65	64	67	66	63
Minimum	-7.2114	-2.7647	-13.6318	-10.3739	-1.0485
Q1[a]	-0.7629	-0.3808	-0.5740	-0.5135	-0.3751
Median	0.0467	0.2756	0.0064	0.2192	-0.0104
Q3[a]	0.8941	1.1312	0.9512	0.8536	0.7990
Maximum	5.3639	4.8751	6.5185	3.4881	3.0709
Mean	-0.0263	0.4357	0.0094	0.1248	0.1936
SD	1.9576	1.3613	2.3879	1.6614	0.8251
T	-0.11	2.56	0.03	0.61	1.86
Pr > |T|	0.9140	0.0129	0.9745	0.5438	0.0673
W	0.09	2.27	0.92	1.74	1.14
Pr > |W|	0.9282	0.0232	0.3576	0.0818	0.2542
H[b]	2.5566				
J[c]	-0.1831				

[a] Q1=first quartile; Q3=third quartile.

[b] Test of H_0: $\tau_1=\tau_2=...=\tau_5$ versus H_a: at least one mean (τ) is not the same. H is the Wallis-Kruskal statistic. Cannot reject the null at the 5% level if H<9.49.

[c] Test of H_0: $\tau_1=\tau_2=...=\tau_5$ versus H_a: $\tau_1\geq\tau_2\geq...\geq\tau_5$ with at least one strict inequality. J is the Jonckheere-Terpstra statistic. Cannot reject the null at the 5% level if J<1.645.

The results for the distributions of $DBVU_E$ and $DBVU_D$ in Tables 13 and 14, respectively, provide no discernable pattern. With the exception of group 3, none of the group means are significantly different from zero. The Jonckheere-Terpstra J statistic indicates that there is no monotonic decrease in the relative information content of earnings announcements as one goes from low to high news item. However, the Wallis-Kruskal H statistic indicates that the relative information content between groups are not all equal.

In general, the results from these stratified tests are not supportive of each other. Based on the returns measures, DMAJ and DRAW, the decrease in group means increases as one goes from high market value (news item) firms to low market value (news items) firms. This is consistent with the information transmission hypothesis. Based on returns measures alone, the informativeness of quarterly earnings reports for low information availability firms experience the greatest decrease after dividend initiation. However, once we adjust for the contemporaneous level of returns volatility, this information effect no longer persists. The mean standardized variance measures, $DBVU_E$ and $DBVU_D$, are not statistically different following dividend initiation. Neither do they exhibit any significant change in going from low to high information availability groups. There appears to be no monotonic difference in the mean change in total information content ($DBVU_D$) for firms grouped by information availability.

TABLE 11
DISTRIBUTION OF DRAW FOR PORTFOLIOS BASED ON NO. OF NEWS ITEMS

	FIRM SIZE PORTFOLIOS (1=LEAST, 5=MOST)				
	1	2	3	4	5
N	45	92	40	80	68
Minimum	-5.6416	-5.0269	-6.9927	-5.6859	-4.2648
Q1[a]	-0.7078	0.1753	0.4185	0.0847	-0.9469
Median	1.7415	1.5886	1.7555	1.3645	0.5221
Q3[a]	3.3723	3.2141	2.7990	2.5838	1.6834
Maximum	9.1723	7.7009	8.9110	5.9192	6.5617
Mean	1.5995	1.5428	1.4653	1.2798	0.5568
SD	3.0830	2.4669	2.8481	2.1635	2.3436
T	3.48	6.00	3.2[illegible]	5.29	1.8[illegible]
Pr > |T|	0.0011	0.0001	0.0024	0.0001	0.0543
W	3.30	5.32	3.20	4.72	1.80
Pr > |W|	0.0010	0.0001	0.0014	0.0001	0.0588
H[b]	10.2878*				
J[c]	2.6193*				

[a] Q1=first quartile; Q3=third quartile.

[b] Test of H_0: $\tau_1=\tau_2=...=\tau_5$ versus H_a: at least one mean (τ) is not the same. H is the Wallis-Kruskal statistic. Cannot reject the null at the 5% level if H<9.49.

[c] Test of H_0: $\tau_1=\tau_2=...=\tau_5$ versus H_a: $\tau_1 \geq \tau_2 \geq ... \geq \tau_5$ with at least one strict inequality. J is the Jonckheere-Terpstra statistic. Cannot reject the null at the 5% level if J<1.645.

* Significant at the 5% level using a one-tailed test.

TABLE 12
DISTRIBUTION OF DMAJ FOR PORTFOLIOS BASED ON NO. OF NEWS ITEMS

	FIRM SIZE PORTFOLIOS (1=LEAST, 5=MOST)				
	1	2	3	4	5
N	45	92	40	80	68
Minimum	-6.5091	-5.2964	-6.1745	-3.5399	-4.0065
Q1[a]	-0.3792	-0.0396	0.0547	-0.1967	-0.8519
Median	1.8883	1.3843	2.0159	1.2342	0.3210
Q3[a]	3.4979	3.1635	3.3842	2.4626	1.7938
Maximum	9.8017	7.4536	7.1067	6.1621	5.9768
Mean	1.8230	1.4624	1.6080	1.1782	0.6300
SD	3.3569	2.4725	2.7286	2.0246	2.1987
T	3.64	5.67	3.73	5.20	2.36
Pr > |T|	0.0007	0.0001	0.0006	0.0001	0.0210
W	3.41	5.67	3.73	5.20	2.36
Pr > |W|	0.0006	0.0001	0.0003	0.0001	0.0182
H[b]	9.4949*				
J[c]	2.7262*				

[a] Q1=first quartile; Q3=third quartile.

[b] Test of H_0: $\tau_1=\tau_2=...=\tau_5$ versus H_a: at least one mean (τ) is not the same. H is the Wallis-Kruskal statistic. Cannot reject the null at the 5% level if H<9.49.

[c] Test of H_0: $\tau_1=\tau_2=...=\tau_5$ versus H_a: $\tau_1\geq\tau_2\geq...\geq\tau_5$ with at least one strict inequality. J is the Jonckheere-Terpstra statistic. Cannot reject the null if J<1.645.

* Significant at 5% level using a one-tailed test.

TABLE 13
DISTRIBUTION OF $DBVU_E$ FOR PORTFOLIOS BASED ON NO. OF NEWS ITEMS

	FIRM SIZE PORTFOLIOS (1=LEAST, 5=MOST)				
	1	2	3	4	5
N	45	92	40	80	68
Minimum	-7.0975	-3.9293	-1.5222	-3.3461	-7.0369
Q1[a]	-0.0897	-1.0469	-0.2689	-0.4310	-0.8351
Median	0.0336	0.0293	0.7221	0.0897	-0.1813
Q3[a]	1.0041	1.0610	1.3258	0.6437	0.4573
Maximum	4.4923	6.2366	4.8623	5.1343	2.8748
Mean	0.0024	0.1548	0.6755	0.0632	-0.2103
SD	2.1131	1.7655	1.1946	1.1790	1.2715
T	0.01	0.84	3.58	0.48	-1.36
Pr > |T|	0.9940	0.4024	0.0009	0.6328	0.1771
W	0.45	0.38	3.28	0.70	-1.46
Pr > |W|	0.6528	0.7040	0.0010	0.4840	0.1442
H[b]	11.8148*				
J[c]	1.4030				

[a] Q1=first quartile; Q3=third quartile.

[b] Test of H_0: $\tau_1=\tau_2=...=\tau_5$ versus H_a: at least one mean (τ) is not the same. H is the Wallis-Kruskal statistic. Cannot reject the null if H<9.49.

[c] Test of H_0: $\tau_1=\tau_2=...=\tau_5$ versus H_a: $\tau_1\geq\tau_2\geq...\geq\tau_5$ with at least one strict inequality. J is the Jonckheere-Terpstra statistic. Cannot reject the null at the 5% level if J>1.645.

* Significant at the 5% level using a one-tailed test.

TABLE 14
DISTRIBUTION OF $DBVU_D$ FOR PORTFOLIOS BASED ON NO. OF NEWS ITEMS

	FIRM SIZE PORTFOLIOS (1=LEAST, 5=MOST)				
	1	2	3	4	5
N	45	92	40	80	68
Minimum	-7.2114	-13.6318	-1.3339	-5.7861	-3.1993
Q1[a]	-0.7629	-0.5921	0.1358	-0.3647	-0.5277
Median	0.1868	0.0714	0.7632	0.1048	-0.0717
Q3[a]	1.0446	1.1932	1.2732	0.7652	0.4795
Maximum	4.0260	6.5185	4.8751	3.4881	3.1993
Mean	0.0482	0.1039	0.7711	0.0608	-0.0028
SD	1.9836	2.4677	1.1524	1.0976	1.0661
T	0.16	0.40	3.58	0.48	1.36
Pr > |T|	0.8713	0.6873	0.0001	0.6223	0.9828
W	0.80	1.04	3.78	1.39	-0.48
Pr > |W|	0.4238	0.2984	0.0002	0.1646	0.6312
H[b]	11.8098*				
J[c]	1.2855				

[a] Q1=first quartile; Q3=third quartile.

[b] Test of H_0: $\tau_1=\tau_2=...=\tau_5$ versus H_a: at least one mean (τ) is not the same. H is the Wallis-Kruskal statistic. Cannot reject the null at the 5% level if H<9.49.

[c] Test of H_0: $\tau_1=\tau_2=...=\tau_5$ versus H_a: $\tau_1\geq\tau_2\geq...\geq\tau_5$ with at least one strict inequality. J is the Jonckheere-Terpstra statistic. Cannot reject the null at the 5% level if J<1.645.

* Significant at the 5% level using a one-tailed test.

This contradicts the information transmission hypothesis as one would expect the increase in the proportion of publicly released information to be greatest for low information availability firms.

This inconsistency between the standardized variance and returns information content measures calls for further investigation of returns volatility around dividend initiation. It is possible that a contemporaneous decrease in returns volatility is producing the results obtained. This is investigated in the next chapter.

The Market Reaction to Earnings Changes

Before going on to examine the effect of the contemporaneous decline in returns variance, I analyze the price reaction to reported quarterly earnings change. This section provides further proof that what has been previously interpreted as a decrease in earnings informativeness caused by dividend initiation may be due to a contemporaneous decrease in returns volatility.

The relationship between market price reaction and reported earnings is modeled as

$$CER_{jq} = \beta_0 + \beta_1 D + \beta_3 \Delta E_{jq} + \beta_4 D \Delta E_{jq} \qquad (1)$$

The 3-day cumulated excess returns for the day prior to, the day of and the day following the earnings announcement date for quarter q and firm j is denoted by CER_{jq}. The dummy

variable D takes on the value 1 if the quarterly earnings announcement comes from the post-dividend initiation period and is zero otherwise. The earnings surprise or standardized earnings is the quarterly change in earnings per share deflated by the firm's share price two days before the earnings announcement.

$$\Delta E_{jq} = \frac{EPS_{jq} - EPS_{jq-1}}{P_{j,t-2}}$$

The change in quarterly earnings is appropriate based on a random-walk expectations model. Deflating by the share price captures any expectations about the forthcoming earnings formed through information gathered between earnings announcements.

The regression approach allows us to incorporate information contained in the earnings report (namely, the change in earnings per share) which we could not do in the above analysis based on groups. This controls for the potential bias that could occur if earnings changes are smaller or less variable in the post-dividend period. This is similar to the approach used by Healy and Palepu (1988).

The average price response to earnings announcement for the whole sample is β_0. Any change in the average price response in the post-dividend initiation period is captured by β_1, and the average market price reaction to a given level of earnings surprise is β_2. It is expected to be positive indicating that

the market responds positively (negatively) to earnings improvements (declines). The average post-dividend initiation adjustment to β_2 is β_3.

If dividends enable investors to revise their expectations of earnings, their forecast errors in the post-dividend period will be reduced. However, measures of unexpected earnings which only incorporate quarterly earnings changes will not reflect this additional information obtained from dividends. Standardized quarterly earnings changes will be noisier estimates of unexpected earnings. Therefore, the market price response to our measure of earnings surprise should be reduced. Coefficient β_2 is expected to be negative.

I estimate equation (1) using ordinary least squares. For each firm in my sample, 8 quarters preceding and following the initial dividend are collected. A quarter is excluded if the announcement is joint, i.e. earnings and dividend announcements within 2 days of each other. A quarter is also excluded if there was no data on net income, share price or shares outstanding to calculate the standardized earnings. I require that a firm had 4 usable pre- and post-dividend initiation quarters. This requirement excludes 58 firms leaving 274 firms for the regression analysis.

For comparison, I also ran the regression using the variance adjusted measure BVU_E.

$$BVU_{E,jq} = \beta_0 + \beta_1 D + \beta_3 |\Delta E_{jq}| + \beta_4 D |\Delta E_{jq}| \qquad (2)$$

This regression thus analyzes the relationship between the market response adjusted for the firms's returns volatility and the reported quarterly earnings before and after dividend initiation. Because the earnings surprise BVU_E is based on squared excess returns and is always positive, I use the absolute value of the earnings surprise as the independent variable. The interpretation on β_2 and β_3 remains the same.

The results of the regressions are shown in Table 15. For the 3-day cumulated excess returns CER, the sample mean β_0 is 5.4832 and is highly significant. This indicates that dividend-initiating firms experienced an average 5.5% price revaluation at quarterly earnings during the 2 year period preceding dividend initiation. The coefficient β_1 is -0.8237 and is highly significant. For the quarters in the 2 year period following dividend initiation the average price reaction is reduced by 0.82%. These results are of course restatements of those obtained in Table 5.

The coefficient β_2 is 0.1925 and significant, indicating that the announcement of a 1% increase in standardized earnings on average leads to a 0.2% increase in stock price. However, the coefficient β_3 has a positive value of 0.1828. For post-dividend quarterly earnings announcements, a 1% increase in standardized earnings on average gives rise to a 0.38% increase in stock price. This result directly

TABLE 15
MARKET PRICE RESPONSE TO STANDARDIZED EARNINGS

Dep. Var.	CER[a]	BVU_E[b]
β_0	5.4832 (47.538**)[c]	1.9508 (24.385**)
β_1	-0.8237 (-5.025**)	-0.0698 (-0.613)
β_2	0.1925 (2.174*)	0.0131 (0.214)
β_3	0.1828 (0.480)	0.1232 (0.465)
F	10.376**	0.224
Adj. R^2	0.0072	-0.0006
No. of Firms	274	
No. of Obs.	3901	

[a] Model estimated is

$$CER_q = \beta_0 + \beta_1 D + \beta_3 \Delta E_q + \beta_4 D \Delta E_q$$

[b] Model estimated is

$$BVU_{E_q} = \beta_0 + \beta_1 D + \beta_3 |\Delta E_q| + \beta_4 D |\Delta E_q|$$

CER is the cumulated 3 day excess returns; one day prior to, the day of and the day following the quarterly earnings announcement. D is a dummy variable which takes on the value 1 if the quarterly earnings occurs after dividend initiation and is zero otherwise. The standardized earnings is the change in earnings per share from the prior quarter divided by the stock price two trading days before the earnings announcement.

$$\Delta E = \frac{EPS_q - EPS_{q-1}}{P_{t-2}}$$

[c] t-statistics in parentheses.
* Significant at the 1% level using a two-tailed test.
** Significant at the 5% level using a two-tailed test.

contradicts the notion that dividends convey information that leads investors to better forecast earnings. The coefficient β_3 is, however, not statistically significant.

My regression results yield results diametrically opposite to those obtained by Healy and Palepu (1988). They obtain a significantly negative β_3. I suspect that this difference arises out of a difference in regression technique and model specification. Healy and Palepu apparently use a seemingly unrelated regressions technique for estimation. This allows their estimates of β_0 and β_2 to be firm specific. In obtaining these firm specific coefficients, their model specification excludes the β_1 coefficient. Any decrease in returns volatility is thus forced onto β_3 which biases it to be negative.

The results for the regression using the standardized variance measure of informativeness is consistent with prior results. The relative informativeness of quarterly earnings does not change after dividend information. The market response at quarterly earnings announcements relative to non-announcement periods is not significantly related to the earnings reported, nor does this responsiveness change after dividend initiation.

CHAPTER 5
RETURNS VOLATILITY AROUND DIVIDEND INITIATION

In the previous chapter, I examined the information content of quarterly earnings announcements before and after dividend initiation. The information content measures used are directly related to the volatility of returns. A possible explanation for the observed decrease in the price reactions associated with post-dividend initiation earnings announcements is that returns volatility has decreased.

Declines in returns volatility may be caused by changes in the process by which information is impounded in price. For example, dividend initiation may induce greater consensus among traders. This decreases noise trading and bid-ask spreads and consequently returns variance. However, volatility also may decrease due to causes that are independent of any information motivated reason. Dividend initiating firms experience increases in stock price which lead to proportionally smaller bid-ask spreads and reduced leverage. Finally, the observed volatility decreases in my sample could be due to unrelated market wide changes in interest rates. In this chapter, I perform several tests to distinguish the causes of the observed volatility decrease. I conclude that

information is not the only plausible cause for volatility to decline.

Variance Changes in the Overall Sample

Table 16 shows the distribution of percentage changes in variances calculated for different sampling periods around dividend initiation. The sampling periods cover 900, 500, 250 and 100 trading days immediately before and after the declaration of the initial dividend. Fewer firms are available for the longer sample periods because of the longer sequence of returns required. For the 100, 250, 500 and 900 day sampling periods, I require at least 90, 240, 480 and 850 returns, respectively. Variances are calculated as the sum of the squared continuously compounded returns since Var[R] approximately equals $E[R^2]$ for short measurement intervals. The percentage change in variance is

$$\text{Percentage variance change} = 100 \times [1 - \frac{VAR_{POST}}{VAR_{PRE}}]$$

A variance decrease after dividend initiation gives rise to a positive percentage change.

The mean percentage change is positive for all (except the 100 day) sampling periods. This indicates a decline in measured returns volatility. The median is a better statistic of location since the mean percentage variance change is

TABLE 16
DISTRIBUTION OF PERCENTAGE VARIANCE CHANGES

Period[a]	900	500	250	100
Sample[b]	225	304	327	331
Min	-260.12	-310.63	-382.41	-1196.15
Q1	13.05	-12.14	-20.03	-25.86
Median	39.44	33.65	20.33	9.68
D[d]	55.20	54.58	43.73	36.83
Max	80.59	86.77	80.31	81.33
Mean	26.94	13.50	3.52	-10.06
SD	46.29	59.78	61.69	92.38
No. Pos.[c]	182	212	216	186
% Pos.	80.9	69.7	66.1	56.2
D[d]	0.8884	0.8354	0.8152	0.6024
Pr>|D|	0.0	0.0	0.0	0.0
T[e]	8.47	3.94	1.03	-1.98
Pr>|T|	0.0001	0.0001	0.3035	0.0484
W[e]	8.59	5.79	4.09	1.14
Pr>|W|	0.0001	0.0001	0.0001	0.2559

[a] Percentage variance changes are calculated as

$$\text{Percentage variance change} = 100 \times [1 - \frac{VAR_{POST}}{VAR_{PRE}}]$$

Variances are calculated using daily continuously compounded stock returns from sample periods of 900, 500, 250 and 100 trading days before and after the declaration day of the initial dividend.

[b] For 900, 500, 250, and 100 day sampling periods, a firm is included if it has 850, 480, 240, and 90 valid returns, respectively.

[c] Number of firms in sample with positive percentage variance changes, i.e. variance decreases after dividend initiation.

[d] Shapiro-Wilk test of normality.

[e] Test of H_0: Percentage variance change = 0.

downwardly biased.[1] The medians are positive for all sampling periods and always greater than the means. The longer the sampling period, the more apparent is the volatility decline. The median percentage change is 39% for the 900 day sample period, this declines to 10% for the 100 day sample period. The proportion of firms experiencing volatility declines also increases with longer sampling periods: 56% for the 100 day sample period increasing to 81% for the 900 day sample period. The Wilcoxon signed-rank tests of the null hypothesis that the percentage variance change is zero are rejected for all (except the 100 day) sample periods.

When examining changes in stock return variance, it is important to consider changes in market volatility through time. This is particularly so for my sample which has dividend initiation dates dispersed over 17 years and where there is also considerable clustering in the middle seventies. It is possible that any observed change in market variance around the time of dividend initiation is explained by contemporaneous changes in market volatility.

To address this possibility, I divide firm variances by an estimate of market volatility. This estimate is obtained from the contemporaneous returns on an equally weighted market index of all firms on the relevant data tape. This adjustment is in the spirit of a heteroskedasticity adjustment, where the

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[1] From Jensen's inequality, $E[V_{PRE}/V_{POST}] > E[V_{PRE}]/E[V_{POST}]$.

stock's return variance is assumed proportional to that of the market. Table 17 shows the distribution of percentage variance changes where the firm variances have been adjusted by a contemporaneous estimate of the market variance. It appears that changes in market volatility explain part of the variance decline. Median percentage changes are smaller after standardization but are still positive. The Wilcoxon signed-rank tests can only reject equal variances for the 900 day sample period. This provides some evidence that clustering of the data sample may explain the observed variance decreases.

Variance Ratio Tests

Consider returns calculated over intervals of k days where k>1. If daily returns follow a random walk, the variance of these k-day returns should be k times the variance of daily returns. French and Roll (1986) model a stock's return as having 3 components: a rational information (intrinsic value) component, a noise or mispricing component and a bid/ask error component. If noise and bid/ask error components are temporary components, over time, they will be corrected and induce negative autocorrelations. This negative autocorrelation causes the k-day variance to be less than k times the daily variance. A variance ratio (VR) is the ratio of k-day returns variance to daily returns variance (French and Roll (1986)

TABLE 17
DISTRIBUTION OF MARKET ADJUSTED PERCENTAGE VARIANCE CHANGES

Period[a]	900	500	250	100
Sample[b]	225	304	327	331
Min	-198.86	-272.93	-406.08	-803.86
Q1	0.36	-31.79	-31.85	-43.60
Median	28.73	13.29	6.28	5.22
Q3	48.10	45.73	39.83	30.41
Max	90.54	80.75	79.44	79.81
Mean	17.73	-2.74	-6.50	-10.06
SD	46.33	66.64	66.25	92.15
No. Pos.[c]	169	181	184	176
% Pos.	75.1	59.5	56.3	53.2
D[d]	0.8452	0.8544	0.8367	0.6862
Pr>|D|	0.0	0.0	0.0	0.0
T[e]	5.74	-0.72	-1.77	-3.85
Pr>|T|	0.0001	0.4736	0.0769	0.0001
W[e]	7.21	1.84	0.75	-1.70
Pr>|W|	0.0001	0.0666	0.4556	0.1359

[a] Percentage variance changes are calculated as

$$\text{Percentage variance change} = 100 \times [1 - \frac{VAR_{POST}}{VAR_{PRE}}]$$

Variances are calculated using daily continuously compounded stock returns from sample periods of 900, 500, 250 and 100 trading days before and after the declaration day of the initial dividend. Firm variances are divided by the returns variance of a value-weighted market index.

[b] For 900, 500, 250, and 100 day sampling periods, a firm is included if it has 850, 480, 240, and 90 valid returns, respectively.

[c] Number of firms in sample with positive percentage variance changes, i.e. variance decreases after dividend initiation.

[d] Shapiro-Wilk test of normality.

[e] Test of H_0: Percentage variance change = 0.

call these actual-to-implied variance ratios).

$$VR_k = \frac{\frac{1}{k}Var(R^k)}{Var(R^1)}$$

where R^k is the k-day return. Under the null hypothesis that returns follow a random walk, the VR should be equal to one. If there are transitory components, the VR should be smaller than one.[2] The VR therefore allows us to gauge the effect of the transitory bid/ask and noise components. VRs have been used in recent studies by French and Roll (1986), Fama and French (1988), Lo and Mackinlay (1988), and Kaul and Nimalendran (1990). Cochrane (1988), Lo and Mackinlay (1989), and Richardson and Smith (1991) analyze the properties of the VR test statistic. In general, they find that the VR test statistic is robust and has higher relative power compared with alternative test statistics.

If dividend initiation reduces the bid/ask error component (either due to improved liquidity or reduced information asymmetry) or noise trading (better informed traders with greater consensus) then post-dividend initiation VRs should be closer to one than pre-dividend initiation VRs. Table 18 shows the summary statistics for 10-day and 20-day return variances

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[2] It can be shown that VR(k) can be written as a function of estimated autocorrelations of returns measured over the basic measurement interval (daily in our case).

$$VR_k \simeq 1 + \frac{2}{k}[(k-1)\rho_1 + (k-2)\rho_2 + \ldots + \rho_{k-1}]$$

TABLE 18
DISTRIBUTION OF VARIANCE RATIOS FOR
PRE- AND POST-DIVIDEND INITIATION 500 DAY SAMPLE PERIODS.

	Sample = 310					
	VR_{10}			VR_{20}		
	PRE	POST	DIFF[a]	PRE	POST	DIFF[a]
Minimum	0.294	0.326	-0.867	0.215	0.250	-1.093
Q1	0.775	0.794	-0.180	0.743	0.709	-0.178
Median	0.949	0.950	0.018	0.915	0.917	0.030
Q3	1.166	1.142	0.171	1.211	1.148	0.234
Maximum	1.942	1.921	1.114	2.532	2.078	1.504
Mean	0.993	0.983	0.010	0.985	0.960	0.025
T[b]	0.61 (0.5406[d])			1.18 (0.2392[d])		
W[c]	0.51 (0.6077[d])			1.31 (0.1921[d])		

[a] For each firm, the difference between pre- and post-dividend initiation variance ratios is DIFF = PRE - POST.
[b] t test of H_0: DIFF = 0.
[c] Wilcoxon signed-rank test of H_0: DIFF = 0.
[d] Significance level of two-tailed test.

obtained from 500 day sample periods before and after dividend initiation. The 10-day (20-day) returns are obtained by multiplying 10 (20) successive daily returns. Therefore, in a 500 day sample period there are fifty 10-day an twenty five 20-day returns. The VRs are all less than one for both pre- and post-dividend initiation periods. Mean and median pre-dividend initiation VRs are smaller than post-dividend initiation VRs but this difference is not statistically significant (Wilcoxon signed-rank test). Therefore, I cannot

conclude that variance decreases are due to reductions in bid-ask spreads or noise trading.

The Timing of Variance Changes

The results show that the decrease in the price revaluations at earning announcements in the post-dividend initiation period may be related to the general decline in returns variability. This decline may be caused by an information effect associated with dividend initiation. To ascribe causality to this information effect requires that variance changes should occur after the initiation of dividends. On the other hand, if variance changes do not systematically occur after dividend initiation, the plausibility of an dividend initiation information effect is questionable.

In this section, I analyze the timing of variance changes. I first examine percentage variance changes calculated over successive 250 day sample periods beginning 750 trading days prior to dividend initiation. Due to the long series of returns required, only 272 firms are included in the sample. Table 19 shows the distribution of these percentage variance changes. The sample of firms experience significant variance declines in the year prior to (period [-250,-1]) as well as the year after (period [1,250]) the initiation of dividends.

TABLE 19
SUMMARY STATISTICS OF PERCENTAGE VARIANCE CHANGES (250 DAY SAMPLE PERIOD) FOR SUCCESSIVE PERIODS

Sample	272			
Period[a]	-500,-251	-250,-1	1,250	251,500
Median	7.266	13.29	6.28	5.22
Mean	-5.052	-2.74	-6.50	-10.06
No. Pos.[b]	129	164	161	136
% Pos.	47.4	60.2	59.1	50.0
W[c]	0.98	4.40	2.75	1.20
Pr>|W|	0.3297	0.0001	0.0026	0.2324

[a] Percentage variance changes for period (-500,-251) are calculated as

$$\text{Percentage variance change} = 100 \times \left[1 - \frac{VAR_{(-500,-251)}}{VAR_{(-750,-501)}}\right]$$

The period (1,250) is comparable to the pre- and post-dividend initiation percentage variance changes in Table 15. Day 0 is the declaration date of the initial dividend.

[b] Number of firms in sample with positive percentage variance changes, i.e. variance decreases after dividend initiation.

[c] Test of H_0: Percentage variance change = 0.

Therefore the variance decline does not occur strictly after dividend initiation. There is significant variance decline in the year prior to dividend initiation.

To better examine when variance declines occur, I examine successive overlapping periods of 100 trading days. For each firm, I collect 400 trading days of returns: 200 before the initiation of dividends and 200 after. I divide these 400 days

into seven 100 day samples with each sample overlapping the prior sample by 50 days. Sample period one consists of returns from day -200 to -101; sample period two consists of returns from day -150 to -51; sample period three consists of returns from day -100 to -1; and so on. The final sample period seven consists of returns from day 101 to 200. The sample periods are shown in Figure 2.

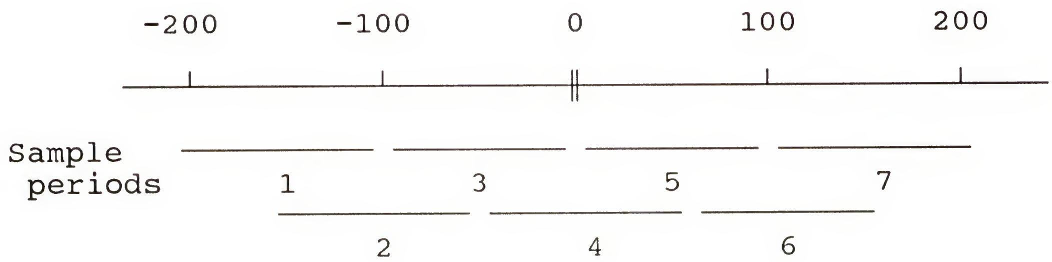

Figure 2
Sample Periods for Detecting Variance Changes

Within each sample period, I test whether a significant variance decrease has occurred. For each firm, I count the number of significant variance decreases occurring in the pre-dividend initiation sample periods 1, 2 and 3 and the post-dividend initiation sample periods 5, 6, and 7. Denote these counts as COUNT1 and COUNT2, respectively. If a variance change is more likely to occur following dividend initiation,

COUNT2 is going to be greater than COUNT1. The test is therefore,

H_0: COUNT2-COUNT1 = 0 versus H_1: COUNT2-COUNT1 > 0

I test this hypothesis using the Wilcoxon signed-rank statistic.

To detect a variance decrease within a sample period, I use a test statistic T* which has been extensively examined by Hsu (1977, 1979). Let M be a consecutively observed sequence of daily returns $R_1, R_2, \ldots, R_M$ which are assumed to be independent normal variates. Further, let the variances of these variables be represented by $\sigma_1^2, \sigma_2^2, \ldots, \sigma_M^2$, respectively. The problem is to test whether a variance shift δ has occurred,

$$H_0: \quad \sigma_1^2 = \sigma_2^2 = \ldots = \sigma_M^2 = \sigma_0^2 \qquad (\sigma_0^2 \text{ is unknown})$$

against

$$H_a: \quad \sigma_1^2 = \sigma_2^2 = \ldots = \sigma k_M^2 = \sigma_0^2;$$

$$\sigma_{k+1}^2 = \sigma_{k+2}^2 = \ldots = \sigma_M^2 = \sigma_0^2+\delta, \qquad |\delta|>0,$$

where k is unknown $(k=1,2,\ldots,M-1)$; δ is unknown and $(\sigma_0^2+\delta)\epsilon(0,\infty)$. Define $X_i=(R_i-\mu)^2$, $i=1,2,\ldots,M$. The test statistic T is defined as

$$T = \frac{\sum_{i=1}^{M}(i-1)X_i}{(M-1)\sum_{i=1}^{M}X_i}, \qquad 0 \leq T \leq 1$$

Under the null hypothesis of no variance shift, this test statistic has mean $E[T]=\frac{1}{2}$ and variance $VAR[T]=(M+1)/[6(M-1)(M+2)]$. I use the large sample approximation $T^{*}=(T-0.5)/\{VAR[T]\}^{\frac{1}{2}}$ which is distributed asymptotically standard normal.

In this test, I calculate T^{*} for each sample period with M=100. I deem that a variance decrease has occurred in that sample period if $T^{*}<-2.6$. This corresponds to a significance level of just under 0.5%. The total firm sample size is 328 firms[3]. Of the 328 firms examined, 83 had no significant variance changes in the 7 sample periods. 56 firms had only variance increases. 189 firms (58% of the sample) had at least one variance decrease in the 7 sample periods. The results of this analysis are shown in Table 20. The frequency distribution of variance decreases by sample periods does not show a preponderance of variance changes occurring after dividend initiation (i.e. in sample periods 5, 6 and 7). This is confirmed by the Wilcoxon signed-rank statistic's value of 0.70.

I conclude from this analysis that the decrease in returns variability does not occur systematically after dividend initiation. Variance decreases occur with equal frequency before and after dividend initiation.

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[3] Four OTC firms were excluded because they did not have an uninterrupted series of consecutive returns. These firms subsequently traded on either the AMEX or NYSE.

TABLE 20
ANALYSIS OF THE TIMING OF VARIANCE DECREASES

Sample Period	1	2	3	3	5	6	7
Beginning Return[a]	-200	-150	-100	-50	1	51	101
Ending Return[a]	-101	-51	-1	50	100	150	200
Decreases[b]	36	41	31	33	44	39	35

[a] The announcement date of the initial dividend is day 1.
[b] A variance decrease is deemed to have occurred if $T^{*}<-2.6$ for that sample period.

H_0: Variance decreases occur with equal frequency before and after dividend initiation.

COUNT2 - COUNT1 = 0

against H_a: Variance decreases occur more frequently after dividend initiation.

COUNT2 - COUNT1 > 0

where COUNT1 = TOTAL NUMBER OF VARIANCE DECREASES OCCURRING IN SAMPLE PERIODS 1, 2 OR 3 FOR FIRM j.

COUNT2 = TOTAL NUMBER OF VARIANCE DECREASES OCCURRING IN SAMPLE PERIODS 5, 6 OR 7 FOR FIRM j.

The Wilcoxon signed-rank statistic W is 0.70.

Cannot reject null at the 5% significance level.

Sample size is 328 firms.

The Effect of Clustered Data

I examine the possibility that specific periods are causing the observed decrease in firm volatility. Just over 75% of my sample firms initiated dividends in the period 1972-77, with over 50% occurring between 1975-1977. The effect of interest rates on volatility is particularly relevant to my sample. The seventies experienced volatile changes in interest rates. In particular, interest rates rose from 1972-73 and fell from 1974-76.[4] It is plausible that for a large number of firms in my sample, pre-dividend periods coincided with a rising interest rate environment (and consequently high returns volatility) and post-dividend periods coincided with falling interest rates (low returns volatility).

If the decrease in firm volatility is independent of secular influences, the proportion of firms experiencing variance declines should not cluster around certain periods. Table 21 shows percentage variance changes calculated for 500 day sample periods distributed by the year of dividend initiation. The table shows that the proportion of firms experiencing variance declines is not constant across the years. In particular, the periods 1972-73 and 1978-79 have a majority of firms experiencing variance increases. Conversely, the period 1975-76 which accounts for almost 40% of my sample of dividend initiating firms has above average proportion of

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[4] See, for example, Livingston (1990) p. 3 or Madura (1989) p. 37.

TABLE 21
DISTRIBUTION OF PERCENTAGE VARIANCE CHANGES
(500 DAY SAMPLE PERIOD) BY YEAR OF DIVIDEND INITIATION

Year	No.[a]	Pos.[b]	% Pos.[c]	Mean	Median
1970	6	5	83.3	20.4	24.5
1971	4	4	100.0	34.2	33.2
1972	18	1	5.6	-73.1	-33.2
1973	29	4	13.8	-57.6	-63.9
1974	24	16	66.7	4.5	19.1
1975	58	57	98.3	54.5	56.8
1976	62	62	100.0	53.4	57.2
1977	47	33	70.2	13.1	26.6
1978	20	9	45.0	-22.4	-4.3
1979	18	4	36.4	-7.2	-4.6
1980	9	6	66.7	8.0	31.1
1981	9	5	83.3	21.8	35.0
1982	4	3	100.0	19.8	16.8
1983	5	4	80.0	23.7	21.7
1986	3	0	0.0	-60.1	-69.0

[a] Number of sample firms initiating dividends in that year.
[b] Number of sample firms with positive percentage variance changes, i.e. variance decreases.
[c] Sample firms with positive percentage variance changes as a percentage of sample firms initiating dividends in that year.

variance decreases. This pattern is also found for variances calculated for 900, 250 and 100 day sample periods.

Table 22 shows the distribution of percentage variance changes adjusted by a estimate of the contemporaneous market variance. Note that after adjusting for market variance, the mean and median percentage variance change is negative for the period 1975-76. Firms initiating dividends in those years experience decreases in variances but of a smaller magnitude than the market.

The behavior of sample firm variances through time is plotted in Figures 3 through 5. Figure 3 plots the monthly variance of an index of dividend initiating firms (VAR) and a weighted average of all firms on the NYSE/AMEX and NASDAQ tapes. For each month (m=1/70 to 12/86), VAR is the average monthly returns variance for a set of dividend initiating firms N_m. A firm is included in N_m if it initiated dividends within 24 months of month m.

$$VAR_m = \frac{1}{N_m}\sum_{j=1}^{N_m} Var_{j,m}$$

The monthly returns variance for the firm j is calculated as

$$Var_{j,m} = \sum_{\tau=1}^{T_m} R^2_{j\tau}$$

where T_m is the number of trading days in month m. If a firm has less than 15 valid returns in any month, it is excluded from VAR. VAR thus represents the mean monthly variance for

TABLE 22
DISTRIBUTION OF MARKET ADJUSTED PERCENTAGE VARIANCE CHANGES (500 DAY SAMPLE PERIOD) BY YEAR OF DIVIDEND INITIATION

Year	No.[a]	Pos.[b]	% Pos.[c]	Mean	Median
1970	6	2	-3.9	-3.9	-9.7
1971	4	1	25.0	-14.9	-15.6
1972	18	14	77.8	28.8	58.1
1973	29	29	100.0	51.4	51.8
1974	24	22	91.7	31.0	37.7
1975	58	9	15.5	-48.4	-36.5
1976	62	24	39.7	-50.5	-16.2
1977	47	35	74.5	18.6	32.0
1978	20	18	90.0	45.2	53.3
1979	11	11	100.0	39.9	42.5
1980	9	6	66.7	17.3	34.5
1981	6	5	83.3	25.0	33.9
1982	3	2	66.7	-6.5	8.8
1983	5	1	20.0	-38.6	-22.9
1986	3	3	100.0	63.7	61.8

[a] Number of sample firms initiating dividends in that year.
[b] Number of sample firms with positive percentage variance changes, i.e. variance decreases.
[c] Sample firms with positive percentage variance changes as a percentage of sample firms initiating dividends in that year.

the sample of dividend initiating firms through a moving window of 24 months.

From 1/70 to 12/72, VarM is the monthly returns variance of the equally-weighted NYSE/AMEX market index. From 1/73 to 12/86, VarM is a weighted average of the monthly returns variance of the equally-weighted NYSE/AMEX and NASDAQ market indices.

$$VarM_m = wVar_{NYSE/AMEX,m} + (1-w)Var_{NASDAQ,m}$$

The weight w corresponds to the proportional representation of NYSE/AMEX firms in the sample (w = 247/332). The monthly variances of the market indices are calculated in the same way as for individual firms.

Figure 3 shows the wide variations in returns variance of the sample. The returns variance is particularly high in the years 1973 to 1976. The sample variance behaves similarly to the wider market. Therefore, variations in return variance are not peculiar to the sample of dividend initiating firms.

Figure 4 plots the monthly variance and the distribution of firms initiating dividends, expressed as a percentage of the total sample (% INIT). This figure illustrates the effect of clustering in the sample. The large proportion of firms initiating dividends between 1975 and 1977 follows a period of above average returns variance. This potentially could explain the reported decrease in returns variance and quarterly earnings price revaluations.

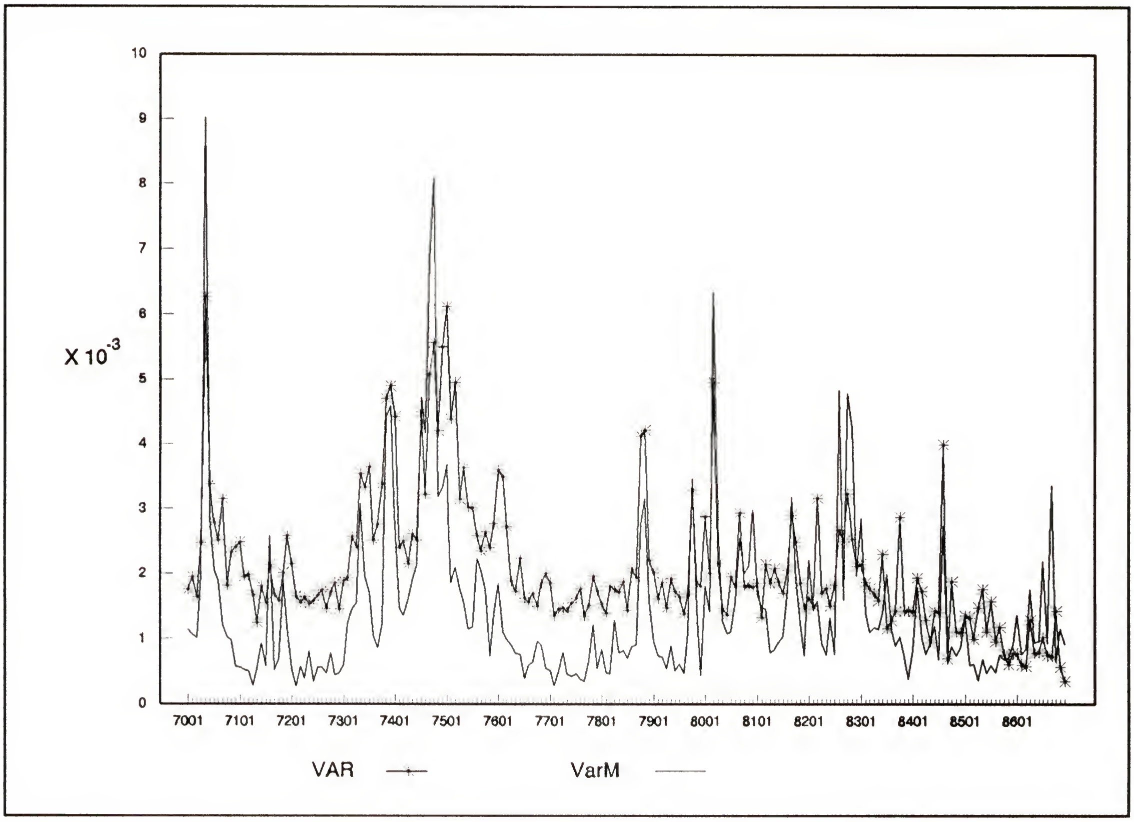

Figure 3
Monthly Returns Variance of an Index of Dividend Initiating Firms (VAR) and a Weighted Market Index (VarM).

Figure 5 plots the monthly variance and the 3-month T-bill rate. The source for the 3 month T-bill rate is the Interest Rates: Money and Capital Market Rates tables from the Federal Reserve Bulletin. The figure shows that the increase in returns variance in the middle seventies appears to be preceded by increases in interest rates. This is not to say that interest rates have caused the changes in returns

volatility. They could both be reactions some other macro-economic event, such as the oil shock of 1973.

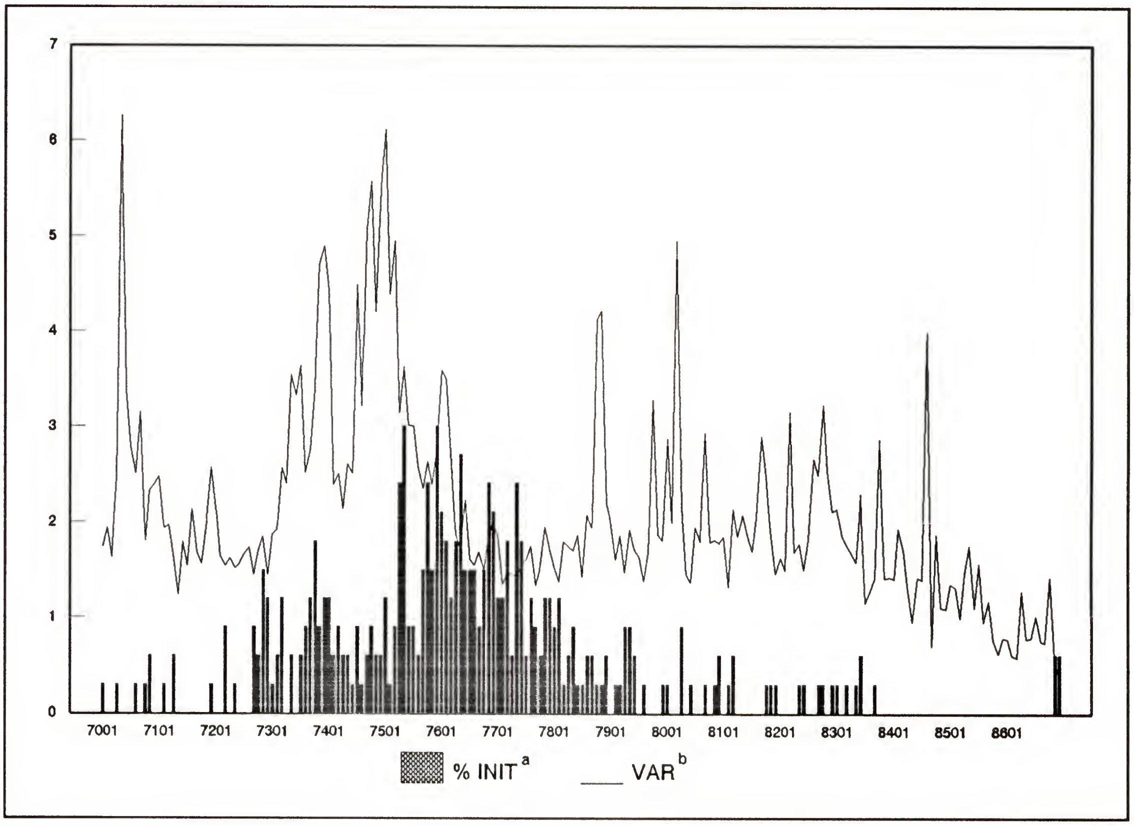

Figure 4
Monthly Returns Variance of an Index of Dividend Initiating Firms (VAR) and the Distribution of Firms Initiating Dividends (% INIT)

[a] Values on the vertical axis are in percentages.
[b] Multiply values on the vertical axis by 10^{-3}.

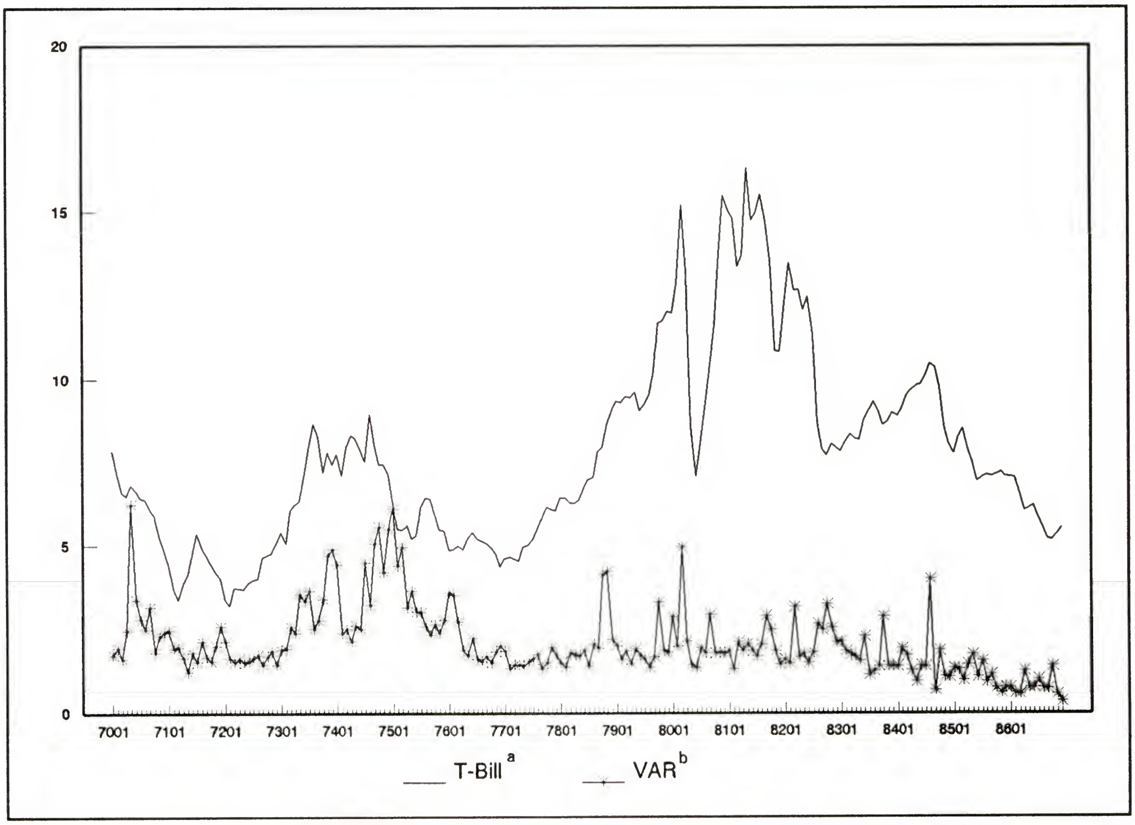

Figure 5
Monthly Returns Variance of an Index of Dividend Initiating Firms (VAR) and the 3-Month Treasury Bill Rate (T-Bill)

[a] Source: Federal Reserve Bulletin. Values on the vertical axis are in percentages.

[b] Multiply values on the vertical axis by 10^{-3}.

The general conclusion that can be drawn from the above analysis is that variance decreases seemingly associated with dividend initiation are not caused by information related factors. Variance decreases do not reduce the degree of negative autocorrelation that would indicate reductions in

noise trading or bid-ask spreads. Neither do they systematically occur following dividend initiation. The variance decreases appear to be occur mostly in the middle seventies when a large proportion of dividend initiations coincide with periods of low interest rates preceded by periods of high interest rates. Variance decreases could therefore be driven by changes in interest rates or other macro-economic events. The evidence in this and the previous chapter tends to reject the hypothesis that there are long run information effects associated with dividend initiation.

CHAPTER 6
SUMMARY AND CONCLUSIONS

It has been suggested that dividends play a role in transmitting information to investors. This hypothesis has motivated the examination of the relationship between dividend initiation and earnings announcements. Previous research has found that the price reactions at earnings announcements are on average lower after dividends have been initiated. This result has been interpreted to support the contention that dividends has conveyed information. Dividend information has preempted information that would otherwise have been conveyed by earnings reports.

I contend that this conclusion is invalid. Showing that price reactions have declined merely shows that earnings and dividends information is substitutable. The testable implication of dividends as an information source is whether dividends reduce costly private information acquisition. The appropriate empirical measure is therefore not earnings returns variance alone but standardized returns variance. If non-announcement returns reflects the private information activities of investors, then standardizing announcement returns variance by the surrounding non-announcement returns gives a measure of the importance of the public announcement.

If private information acquisition is reduced by having dividends, investors should place greater reliance on the firm's public announcements, both dividends and earnings. In addition, this reliance should be greatest for firms for which information is least readily available.

I do not detect any difference in the relative measures of the information content of earnings announcements before and after dividend initiation. This result holds for the total sample of firms as well as when the sample is grouped by proxies of information availability. The information transmission hypothesis is not supported.

What is puzzling is that there is a significant reduction in raw price reactions for post-dividend initiation earnings announcements. I contend that this reduction is caused by a general decrease in the volatility of returns which coincides with dividend initiation. Regression analysis provides evidence that the reduction in post-dividends earnings price reactions is related to the variance decrease and not to a reduction in the information content of earnings.

It can be argued that an information effect associated with dividend initiation causes the decrease in returns volatility. For example, if the initiation of dividends induces greater consensus among traders, noise trading or bid-ask spreads may be reduced. I test for reductions in variance ratios before and after dividend initiation. I do not find any significant change. Further, one should observe the frequency of variance

declines to be higher after dividend initiation. Tests of the timing of variance changes show no evidence of this. Variance decreases appear with equal frequency before and after dividend initiation.

The findings of this study are not supportive of the hypothesis that dividends play an informational role. The search for a valid reason why firms initiate dividend payments must still continue. However, it does provide evidence that the market is sufficiently efficient such that any informational effects from dividends are minor.

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BIOGRAPHICAL SKETCH

Thian Soon Wong was born in Johor Bahru, Malaysia, on March 19, 1958. He received a bachelor's degree in electrical engineering from the University of Malaya, Kuala Lumpur, Malaysia, in 1982 and a Master of Business Administration from the University of Florida in 1986. He expects to receive a Doctor of Philosophy degree in finance from the University of Florida in 1991.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and its fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Robert C Radcliffe

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Professor of Finance, Insurance, and Real Estate

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and its fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and its fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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This dissertation was submitted to the Graduate Faculty of the Department of Finance, Insurance, and Real Estate in the College of Business Administration and to the Graduate School and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

Dean, Graduate School